THE IRON AGE

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A New Electrically Driven Sheet Mill

The Plant of the Apollo Steel Company, Apollo, Pa.—Depressed Bay Roof Construction—Electric Power Throughout

With the recent starting up of the mill of the Apollo Steel Company, Apollo, Pa., an important addition is made to the sheet-producing capacity of the Pittsburgh district. The noteworthy feature of this plant is that it is electrically driven and electric power is used throughout with the single exception that steam is provided in the acid department for requirements which could not well be met in any other way. The Apollo Steel Company was organized in March, 1912, with a capital of $300,000. A site containing 8¼ acres was bought at Apollo, which is on the West Penn Railroad, about 52 miles from Pittsburgh. Ground was broken in June of last year and the plant was practically completed by June 1 of this year. It contains six hot mills and two cold mills and is equipped with two galvanizing pots.

Views of the interior of the plant are given in Figs. 1 and 3, and Fig. 2 is a structural plan of the building with end and side elevations, the latter of which brings out the main feature of the construction—the Aiken depressed bay roof design. This was supplied by the McClintic-Marshall Construction Company, Pittsburgh, which designed and erected the building. Two high transverse bays alternate with one low bay. Excellent distribution of light is secured in this way, the windows being a minimum distance above the floor. Gutters and conductors with their attendant repairs are eliminated as are the pockets of air which in saw-tooth roof construction become highly heated. There is also the elimination of sharp valleys which are apt to become filled with snow and ice, with leakage at the bottom of the windows. With the depressed bay construction the windows may be either horizontal sliding or hinged at the top.

The roof over the entire building is comparatively flat, the slope being ¾ in. to the foot. The covering is a Barrett specification roof on 1¾-in. roof sheathing. The roof line is continuous from peak to eaves. The sides of the building are covered with No. 22 corrugated sheathing, except for a panel of windows in nearly every bay. One side of the building has steel frame corrugated covered doors, which may be removed in warm weather and replaced when cold weather sets in.

The extreme length of the building is 504 ft. As

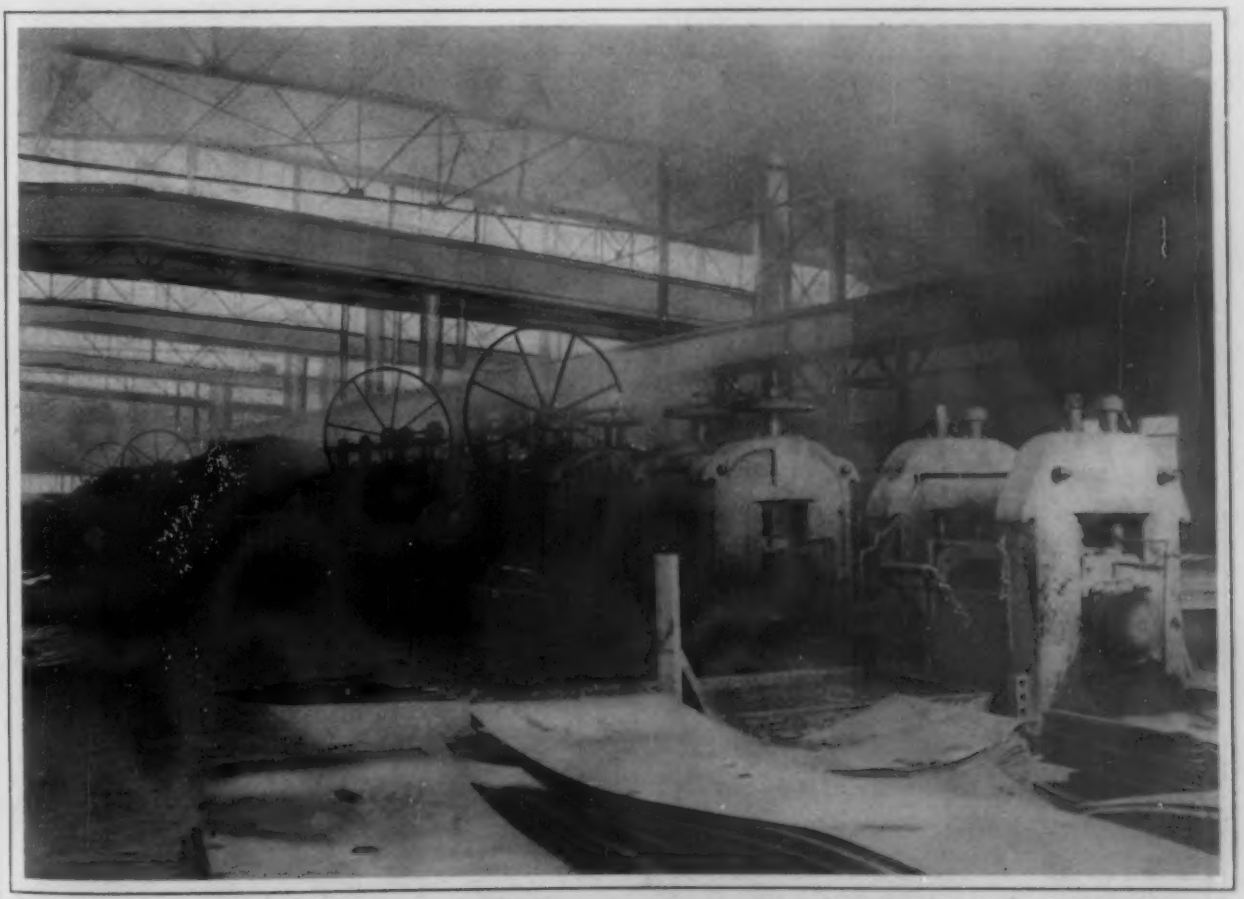


Fig. 1—General View of Hot Mills in the New Sheet Mill Plant of the Apollo Steel Company, Apollo, Pa. Gear Drive is Shown Inclosed in an Oil-Tight Case Made of Steel Plates

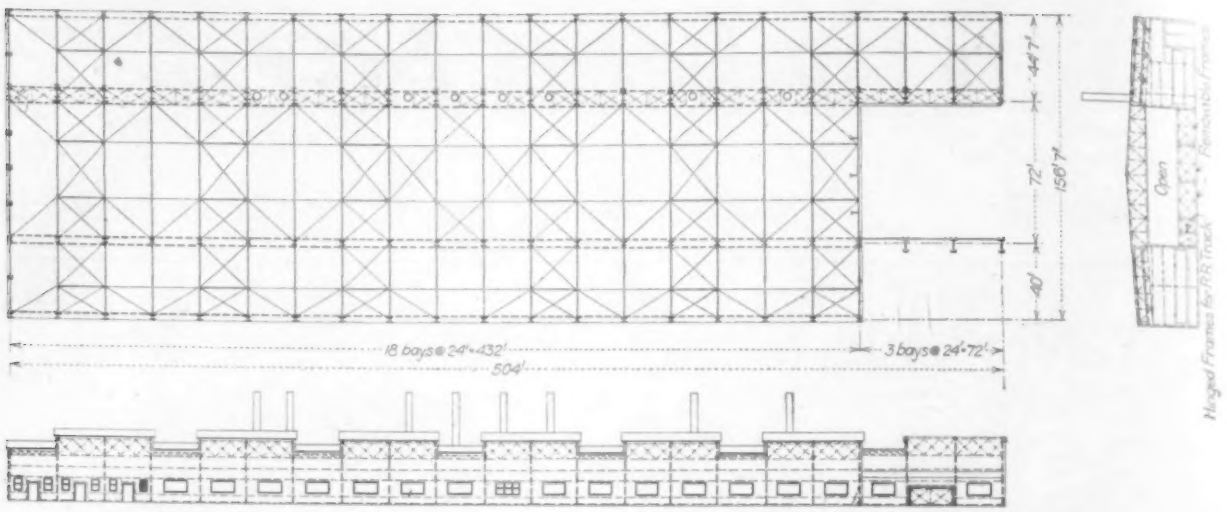


Fig. 2—Plan Showing Alternation of One Depressed and Two High Bays. Side and End Elevations

shown in Fig. 3 there is one main aisle 72 ft. wide and 432 ft. long, one side aisle 44 ft. 7 in. wide and 504 ft. long, and on the opposite side an aisle 40 ft. wide and 432 ft. long. The main aisle has a runway its full length, with an extension 72 ft. beyond the building for receiving yard purposes. This runway carries a 30-ton electric traveling crane. The 40-ft. aisle and the 44-ft. 7-in. aisle each contains a 10-ton electric traveling crane, running its full length.

At the present time no provision has been made for the manufacture of sheet bars, but the company is in possession of property which will enable it to build an open hearth and sheet bar mill. Sheet bars are delivered to the plant over the company's own switch from the main line of the West Penn Railroad, being unloaded by cranes and deposited either in the storage yard or inside the mill. They are picked up by a crane and taken to the shears and cut into lengths, according to the size and gauge of the sheets to be rolled, after which they are loaded on a buggy and delivered to the reheating furnaces. From the latter they are taken by buggy to the roughing rolls. After the heating in pair furnaces and the requisite passes in the finishing rolls, the sheets are sheared to the proper lengths and widths and allowed to cool. Then follows annealing for 24 to 36 hours, transfer to the warehouse in the end of the building and loading direct on cars on a private switch. The layout of the mill is such that the entire process from the time the sheet bars are delivered into the building until the sheets are loaded on cars at the other end is continuous, and there is no re-handling or lost motion.

The Electrical Drive

Probably the most conspicuous feature of the plant is the mill driving mechanism. This consists of a 1400-hp. motor, running at a speed of 240 r.p.m., and a fly wheel and gear set transmitting the power to the mill shaft at approximately 30 revolutions. In order to accomplish this with one set of gears, and to have a smooth and uniform drive, helical cut gearing was employed, the pinion being 30 in. diameter and the gear approximately 20 ft. in diameter. To protect the motor from the severe shocks encountered in sheet rolling, it was necessary to obtain an

Fig. 3—Another View of Hot Mills. The Heating and Annealing Furnaces Are Located on the Right

exceptionally large flywheel effect, and on this account it was deemed advisable to place the flywheels on the motor shaft, making them of cast steel. The peripheral speed of these wheels is approximately 10,000 ft. per minute. The necessary flywheel effect, if obtained from a single wheel, would have required excessive rim weight, and for this reason and also to balance the pinion shaft two flywheels of equal weight were used. These flywheels are keyed to the ends of the pinion shaft, and one of them forms the driven member of the motor coupling.

As the bearing load on the pinion shaft is exceedingly high, it was necessary to use a shaft much larger than is required for the torsional and bending strains encountered, and for this reason it was deemed perfectly safe to overhang the flywheels. The motor is connected to the pinion shaft through an Oldham coupling of improved design, the arrangement being such that wear can readily be taken up and also that either the motor or pinion shaft and its flywheels can be removed independently of each other.

The pinion bearings are self-aligning, and the main gear bearings are of the quarter box type. All four bearings are lubricated from a gravity lubricating system furnished by the S. F. Bowser Company, having capacity to supply about five gallons per minute to each of the bearings. The object of this excessive lubrication is to carry away any heat which may be generated, especially in the pinion bearings, and in case this should at any time be sufficient to heat the oil, the lubricating system has provision for the insertion of cooling coils. The arrangement of the bearings is such as to allow the oil to flow freely along the shaft and out to the oil catchers, from which it is returned to the filter and pumped to the gravity feed tank.

The oiling system does not have any connection to the gear teeth, which are independently lubricated by a splash system, the entire gear set being enclosed in an oil tight gear case of plate construction. This arrangement permits of the use of different qualities of oil on the bearings and gear teeth, which is absolutely essential under the conditions obtaining.

The gear on this drive, which is probably the largest cut helical gear in existence, was designed and built by the United Engineering & Foundry Company, cutting being done by the William Tod Company, Youngstown, Ohio. It consists of two cast steel half rims attached to a central spider, and is 42 in. face by 19 ft. 4 in. pitch diameter. The gear is 19 ft. 7½ in. outside diameter, or 232 in. pitch diameter, with 42 in. face and 116 teeth. The pinion and shaft are one forging 0.60 to 0.70 carbon steel. The pinion is 30 in. pitch diameter, 42 in. face, 15 teeth, making the ratio of the pinion and gear about 7¾ to 1. The teeth are cut with less than 1/32 in. backlash. The spider is a solid iron casting, while the rim is of cast steel made in halves of such construction as to give ample bearing surface, and to be split through the teeth on the line of the helix so as to avoid any weakening of the teeth. The combined weight of the gear and rim is 70 tons. The angle of the helix is 60 deg. The teeth were cut in a specially designed gear planer, and the involute of the tooth is developed from formers in the same way as in the spur gear planer. The pinion is a steel forging integral with its shaft, and is of special steel, heat treated.

The mills are 28-in. pitch diameter. Mill housings and shoe plates are of exceptionally heavy design. The disposal of the stands gives two hot mills (four stands) and one cold mill on the north or incoming side of the motor drive and gear and flywheel equipment, facing the bar heating furnaces. On the other side of the driving mechanism, facing the sheet and pair furnaces are four hot mills (six stands) and one cold mill.

Heating and Annealing Furnaces

The furnaces for the hot mills are of the latest Bailey combination type, stoker fired. The pair furnaces are tandem to the sheet furnaces. Each pair furnace has two separate heating hearths, and they are charged and drawn from each side, one side being heated while the opposite side is being drawn. A center wall divides these two compartments and there is a separate sub-arch over each compartment, thereby preventing a cold charge from affecting a hot charge in the other compartment. Pairs or bars are heated by radiation instead of a direct flame. The heat in the pair furnaces is controlled by sliding tiles, increasing or diminishing the area of radiation surface, thus causing no change in the sheet furnace. All gases or flames pass between the pair furnace crown and sub-crown into the sheet furnace and there are no by-passes to the stack. Waste heat is used in the sheet furnace. Coal is fed into the fire box at the end of the pair furnaces by an Ameri can underfeed stoker of the ratchet drive type. Ordinary 1¼-in. square iron is used for grate bars with sufficient space between bars for a uniform distribution of air over the grate area. The air is admitted under 1½-oz. pressure in volume according to the amount of fuel being fed. Thus no free air is admitted and scaling is prevented. The fires are cleaned once in eight hours, or between turns, when about a wheelbarrow load of ash is removed. The furnace capacity is one ton per hour.

The annealing furnaces are known as the Hagan stoker fired furnace. They are 17 ft. deep by 7 ft. wide in each compartment. There are two double furnaces giving four compartments in all, these handling the output from six mills, which would require six furnaces of the old type. The average fuel consumption per ton of product annealed is given as 226 lb. of slack coal. The furnaces are operated by American underfeed stokers, giving a steady flame. It is stated that if required a 20-ton charge can be brought up to cherry red heat in 2½ hours. The heating and the annealing furnaces were built by Geo. J. Hagan, Pittsburgh.

Coal is dumped from hopper cars into a pit inside the furnace section of the building near the bar shears, at the north or receiving end. From this pit the coal is delivered

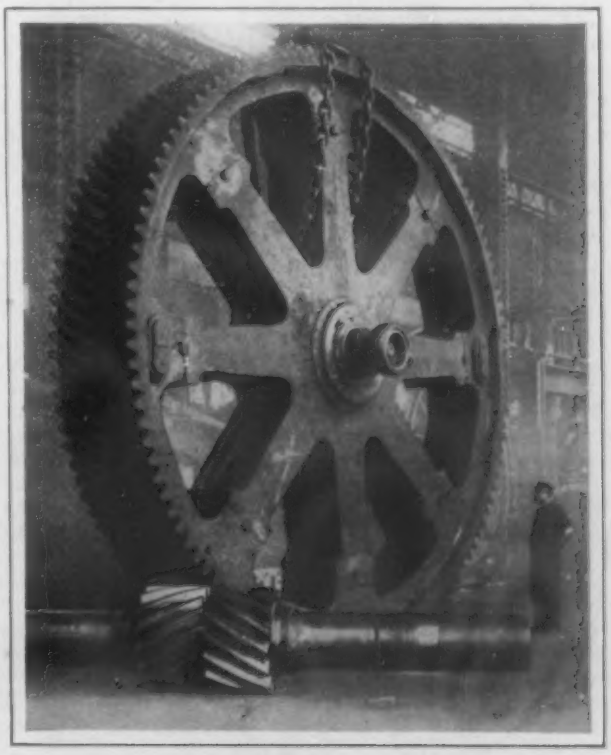


Fig. 4—Gear and Pinion for Flywheel and Gear Set of Electrical Drive

by chutes to large coal buckets which the cranes carry to the furnaces. Each bucket holds sufficient coal for a turn on the furnace, and thus it is expected an accurate record can be kept of the coal consumption of each furnace.

The galvanizing department is equipped with two pots with necessary pickling and washing tanks. The arrangement is somewhat novel, the design being worked out on lines suggested by Robert Lock, president of the company. As the mill is not provided with any regular boiler plant it was necessary to install a small low pressure boiler for heating the pickling tanks in the galvanizing department, and this is the only steam used. In order to avoid the use of high pressure steam, an air compressor was installed, which serves the power doublers, this being the only operation which could not conveniently be taken care of by electric motors.

The water supply for the plant is taken from the Kiskiminetas river by centrifugal pumps working directly

against the mill lines, without the use of a stand pipe. These pumps are of the vertical shaft type and are placed in a well near the pickling department end of the mill. The water is received by seepage through the porous earth formation of the river bank, and the pumps are operated by motors placed at the top of the well, where they are above any possible high water.

The Crane Equipment

consists of three cranes built by the Northern Engineering Works, Detroit. One of these is of 30 tons capacity, 69-ft. span, 20-ft. lift, with a 10-ton auxiliary hoist; the other two are of 10 tons capacity with a span of 37 ft. 6 in. The cranes operate on 220 volt, three-phase, 60-cycle current. The main feeder lines for carrying electric current to the cranes along each crane runway are composed of standard steel rails. This makes a safe construction, doing away with the copper wires ordinarily used. Other safety features include entirely enclosed gears running in oil, with no overhung parts to work loose and fall upon men on the floor. Each set of hoist gearing, with the exception of the drum gear and pinion, which are in a separate case, is nested in a single casting entirely enclosed, so that these parts cannot get out of alignment. This is also the case with the trolley travel gearing. The bridge gearing is entirely covered, so that workmen are protected against injury from clothing being caught in revolving parts. The track wheels are so guarded that it is impossible to run over an obstruction on the track, preventing accident to workmen when making repairs. Footwalks are provided on the crane for easy access to all parts, and each individual shaft with gears in place may be removed without disturbing any other part. The various safety features reduce the chance of accident to a minimum which is in line with the present policy of steel mill construction.

The cranes in the furnace building are used for handling sheets in the pickling department and for bringing cut bars and coal to the furnaces.

Electric Power

for the entire plant is furnished by the West Penn Traction Company on a transmission line from its hydro-electric plant at Connellsville, Pa. The current enters the mill sub-station through open air switches at a pressure of 25,000 volts, three-phase, 60 cycles. All of the power service is alternating current so no motor generators or rotary converters are necessary. The sub-station contains three 750-kva, 25,000-2300 volt three-phase transformers and three 75-kva, 2300-240 volt single-phase transformers connected delta primary and delta secondary. The 750-kva transformers, in which the current is stepped down to 2300 volts, feed into a set of bus bars. The main feeder runs from the bus bars underground through fiber conduit into the mill and up to an elevated control platform, which is located on the sheet floor opposite the center of the roll train and about 10 ft. above the floor, giving the operator an unobstructed view up and down the mill floor. On this platform is located the oil switch panel for starting and stopping the motor which drives the roll trains. This panel is also equipped with an a.c. ammeter, voltmeter and polyphase indicating watt-meter and overload and no-voltage release relays. The master controller which actuates the contractor panel for accelerating the 1400-hp. motor is mounted on the pipe railing in front of the oil switch panel. To start the motor the oil switch is thrown in for either forward or reverse direction of rotation, and the master control switch pulled over to full-on position and the current limit relay on the contractor panel board automatically accelerates the motor in gradual steps.

The alternating circuit induction motor which operates the roll train is nominally rated at 1400 hp., maximum rating of 3500 hp. three-phase, 60 cycles, 2300 volts, 240 r.p.m. no load, 235 r.p.m. full load speed, with 10 per cent. slip regulation. The three 75-kva transformers are used for all cranes, lights and small motors throughout the mill. Three-phase slip ring type a.c. motors are used on all cranes. The danger due to broken trolley wires for the cranes has been done away with and three railroad rails are placed vertically alongside the crane runway and rigidly supported at close intervals by steel brackets. Sliding steel contact shoes collect the current in place of trolley wheels. Drum type controllers are used on all cranes, and all the wiring is in steel conduit.

Mazda lamps of 500 watts are used throughout the mill, spaced 24 ft. apart with 20 in. white enamel steel shades. There are practically no shadows and all parts of the building are equally lighted. Straight multiple wiring is used and each lamp is fused individually with Edison plug fuses.

Three 156-in. shears are driven by 10-hp. 900 r.p.m. three-phase motors; the bar shear by a 30-hp. 900 r.p.m. high resistance motor, and the Buffalo vertical pumps by 10-hp. vertical induction motors. Motors of constant speed type have been provided as follows: For the roll lathe, a 30 hp. motor; for the machine shop, two 10-hp. motors; for the stokers, three 10-hp. motors; for the galvanizing pots, one 10-hp. motor; for the oscillator, one 10-hp. motor; for the portable leveling machine, one 10-hp. motor; for the corrugating machine, one 10-hp. motor; for the small leveling machine, one 5-hp. motor. The air compressor is belted to a 25-hp. slip ring type induction motor with automatic starting panel controlled by pressure governors from the air tank.

Organization

The annual output of the new plant is estimated at 30,000 tons of black and galvanized sheets, 10 to 30 gauge, and it is the intention of the company to galvanize about 80 per cent. of the output. Robert Lock is president, A. M. Oppenheimer vice-president, Charles P. Wolfe secretary and treasurer. N. L. Fitzgerald, general mill superintendent, was for some years connected with the Vandergrift, Pa., works of the American Sheet & Tin Plate Company. Mr. Lock was for more than a year with the Allegheny Steel Company, Brackenridge, Pa., and prior to that time was assistant district manager of the Kiskiminetas department of the American Sheet & Tin Plate Company, embracing sheet mills at Hyde Park, Leechburg and Vandergrift, Pa.

The United Engineering & Foundry Company, Pittsburgh, acted as engineer for the entire plant and also furnished all the mill machinery, including the special driving equipment. Operations thus far indicate that because of the absence of steam engines and with the exceptional construction of the mill driving arrangement and other features incorporated in the design, this will be one of the cleanest and most quietly operating sheet mills in the country.

The Compressed Gas Manufacturers' Association has been organized for the purpose of protecting the property rights of its members and generally to promote their welfare. The office is located at 25 Madison avenue, New York. The officers are as follows: President, Dr. Hugo Lieber, Blaugas Company of America, New York; first vice-president, J. B. Greiner, Liquid Carbonic Company, Chicago; second vice-president, A. Cressy Morrison, Linde Air Products Company, New York; secretary and treasurer, John J. O'Rorke. The association at present is working in friendly co-operation with the Bureau of Explosives looking to the adoption by the Interstate Commerce Commission of proposed amendments to the regulation for the transportation of explosives and other dangerous articles by freight.

The Berger Mfg. Company, Canton, Ohio, has made a contract with the Pedlar People, Ltd., Oshawa, Ont., giving the latter the exclusive sale of Toncan metal in Canada for five years. It is stated that over $1,000,000 is involved in the contract. On account of a 30 per cent. duty on manufactured sheet metal, the Toncan metal will be shipped to Canada in flat sheets, on which the duty is 5 per cent. The contract was closed in Canton last week by A. T. Enlow, formerly sales manager of the Berger Company, but now holding a similar position with the Pedlar People, and W. E. G. Ramsey, vice-president of the Canadian concern, who made a trip to Canton for that purpose.

The Massey-Harris Company, Ltd., Toronto, Canada, manufacturer of farm implements at Toronto, Brantford and Woodstock, has purchased 200 acres at Brampton, Ontario, but the report is not correct that it will build a factory on its newly purchased ground for the manufacture of gasoline engines. So far the establishment of such factory is simply a probability.

The Production of Iron Ore in 1912

Second Greatest Year—Over 55,000,000 Tons Produced, an Increase of 25 Per Cent. Over 1911

The iron ore mined in the United States in 1912 amounted to 55,150,147 gross tons, compared with 43,876,552 tons mined in 1911, an increase of 11,273,595 tons, or 25.69 per cent., according to an advance statement by Ernest F. Burchard, of the United States Geological Survey. The production for 1912 was second only to the output of 1910, falling 1,864,759 tons below the record production of that year, which was 57,014,906 tons.

The following table gives the quantities of iron ore mined in the various States in 1911 and 1912:

Iron Ore Mined in the United States, by States, in 1911 and 1912, in Gross Tons

State	1911	1912
Alabama	3,827,791	4,563,603
California	(a)	2,508
Georgia	203,889	134,637
Kentucky	(a)	27,373
Maryland	(a)	3,200
Michigan	10,329,039	11,191,430
Minnesota	24,645,105	34,431,768
Missouri	65,325	43,480
New Jersey	466,234	364,673
New York	1,061,279	1,216,672
North Carolina	(a)	68,322
Ohio	15,707	10,346
Pennsylvania	537,506	517,081
Tennessee	463,835	416,885
Texas	.....	3,000
Utah	39,903	7,280
Virginia	614,023	446,305
West Virginia	(a)	5,061
Wisconsin	698,660	860,600
Other States (*b*)	908,256	835,923
Total	43,876,552	55,150,147
Percentage increase, 1912		25.69

a Included in "Other States."
b Including, in 1912, Colorado, Connecticut, Idaho, Massachusetts, Montana, Nevada, New Mexico and Wyoming; in 1911, California, Colorado, Connecticut, Idaho, Kentucky, Maryland, Massachusetts, Mississippi, Montana, Nevada, New Mexico, North Carolina, West Virginia and Wyoming.

The rank of the five States producing the largest amount of iron ore—Minnesota, Michigan, Alabama, New York, and Wisconsin—remained unchanged in 1912, but there were a few changes in the relative rank of certain of the smaller producers. For instance, in 1911 Virginia ranked sixth and Pennsylvania seventh, but the rank of these two States was reversed in 1912. Likewise, the rank of New Jersey and Tennessee, respectively eighth and ninth in 1911, was reversed in 1912. The increase in quantity of ore mined in 1912 was made by the mines in the five States of largest production mentioned above; nearly all the other States showed a decrease.

Minnesota Produced Five-Eighths of the Total

The Minnesota iron ranges are producing at present considerably more iron ore than is produced in all the rest of the States together, having furnished nearly 62.5 per cent. of the total for the United States in 1912. The whole Lake Superior district, comprising all the mines in Minnesota and Michigan and part of those in Wisconsin, mined 46,368,878 tons in 1912, or nearly 84.08 per cent. of the total.

An analysis of reported production (quantity mined) in 1912, by ranges, in the Lake Superior district, shows that the Mesaba range mined 32,604,756 tons; the Menominee range 4,465,466 tons, the Gogebic range 3,926,632 tons, the Marquette range 3,545,012 tons, the Vermilion range 1,457,273 tons, and the Cuyuna range, which in 1912 entered upon its second year as a shipper of ore, 369,739 tons, compared with 181,224 tons in 1911, an increase of 104.02 per cent. The output of the Mesaba range aggregated 70.32 per cent. of the production of the Lake Superior district.

Other important districts reported quantities mined in 1912 as follows: Birmingham district, Alabama, 3,957,743 tons, largely of red hematite, but including nearly half a million tons of brown ore; Chattanooga district, Tennessee, Alabama, and Georgia, 778,520 tons, about two-thirds of which was red hematite and one-third brown ore; Adirondack district, New York, 965,736 tons of magnetite; northeastern New Jersey and southeastern New York, 509,282 tons of magnetite.

Marketed Production of Ore

To ascertain as nearly as possible the selling value of the iron ore at the mines, the Geological Survey ascertains not only the quantity of iron ore mined, but the quantity and value of the marketed production, or what corresponds approximately to the shipments of ore from the mines. The total quantity of ore marketed in 1912, according to reports received, was 57,017,614 tons, valued at $107,050,153, compared with 41,092,447 tons, valued at $86,716,575, in 1911. The average price per ton in 1912, according to these figures, was $1.88, compared with $2.11, in 1911. This represents the selling value of the ore f. o. b. at the mines, but does not include any freight costs. The extreme range in values in 1912 was between $1.01 a ton for red hematite and $3.70 for brown ore. The average price for red hematite in 1912 was $1.87; brown ore averaged $1.79, magnetite $2.18, and carbonate ore $1.96.

According to the reports of producers, many of which have been somewhat revised since the report for 1911 was published, the total quantity of iron ore in stock at the mines at the close of 1912 amounted to 10,241,287 tons, compared with 12,206,390 tons at the close of 1911, a reduction of 1,965,103 gross tons, or 16.1 per cent., which balances closely with the excess of sales over quantity mined.

Shelby Iron Company's Annual Report

The Shelby Iron Company, Shelby, Ala., has issued its annual report covering operations for the year ended March 31, 1913. This is one of the comparatively few companies exclusively manufacturing charcoal pig iron. The report goes into details with great particularity. At the beginning of the fiscal year the company had 5279 tons of pig iron in stock and at its close had 3545 tons. But one furnace, the No. 2, was in operation, running 289 days, and it lost $14,868.12. Net profits of $17,789.66 were made in the company's commissaries. Heavy charges were made for depreciation of plant. The profit and loss account was thus reduced from $119,158.15 on April 1, 1912, to $73,280.59 on March 31, 1913. At the close of the year the quick resources were placed at $208,958.13, consisting of cash, $26,440.55; bills and accounts receivable, $81,875.82, and pig iron, merchandise and stocks in commissaries, $100,641.67. Against these current liabilities, consisting of accounts payable, pay rolls, etc., amounted to $27,352.36, leaving the net quick resources $181,605.77. The report includes a reproduction of the article printed in *The Iron Age* of March 6, 1913, entitled "An Increasing Number of Car Wheel Failures," this subject being of interest to the stockholders of the Shelby Company. The president is Ward W. Jacobs, Hartford, Conn.

The Foundry & Machine Exhibition Company, C. E. Hoyt, secretary, has issued from the secretary's office at Chicago its 1913 prospectus. It is a well printed pamphlet of 96 pages, 6⅛ x 9¼ in., announcing the exhibition which is to be held at the International Amphitheater, Chicago, October 10-17. A plan is shown of the exhibition floor containing 75,000 sq. ft. of exhibit space and there are general views of the exhibits at Buffalo and Pittsburgh in the past two years. As illustrating the character of the attendance at these exhibitions the names and addresses are given of a considerable number of those who visited the exhibit at Buffalo, held in connection with the foundry conventions of 1912.

The Kendall Nail & Supply Company, incorporated in 1905 with a capital stock of $50,000, and engaged in the sale of the product of the J. C. Pearson Company, Boston, with office at 949 Broadway, New York, was petitioned into bankruptcy, June 19, by creditors with claims aggregating $176,680. Samuel D. Elmore and Cortlandt Betts have been appointed receivers and authorized to continue business 30 days. George A. Enell, president of the company, died June 10.

The two new blast furnaces of the Pittsburgh Steel Company, at Monessen, Pa., are practically completed, there still being some trestle work, and both will be ready to blow in about July 15.

The New Selective Head Lathe

The Adoption of an Automobile Type of Transmission a Feature

In the new lathe which has recently been placed on the market by the Lodge & Shipley Machine Tool Company, Cincinnati, Ohio, the selective type of automobile transmission has been adopted for the gear box drive. In this way, any one of the spindle speeds can be selected instantly, which gives the lathe its name, and at the same time strength, simplicity and durability are combined in the construction. This type of drive has been applied to all of the builder's lathes, so that practically any size and kind of work can be handled. A high mechanical efficiency is claimed for the drive, due to the fact that, among other things, power is transmitted through hardened steel gears, mounted on shafts, running in ball bearings, with the resulting elimination of friction losses in the journals and the gears. Fig. 1 is a view of an 18-in. belt-driven lathe with the manufacturing equipment of multiple stops for cross and longitudinal feeds. Rear and interior views of the selective head are given in Figs. 2 and 3, respectively, while the spindle and face gear, and the new type of spindle nose construction employed is illustrated in Fig. 4.

The headstock is of box section, with the sides extended up to the center line of the spindle, and further stiffness is secured by internal bracing with both longitudinal and cross ribs. The back of the headstock is planed to receive the gear box, which is a separate unit, and all the gearing is totally inclosed by covers. There are six speed changes in the gear box, and from there the drive is either direct to the spindle or through shifting back gears in the headstock proper, giving twelve spindle speeds in all back geared lathes from 14 to 27 in. The 30 and 36 in. lathes can be built with the regular type of back gears, in which case they have twelve speed changes, or they can be furnished with triple gearing when eighteen changes are available, six by direct drive from the gear box, six through the back gears, while the third set of the slowest six speeds is obtained through the triple gearing driving into the internal gear of the face plate. On the 42 and 48 in. machines, the triple gearing is always supplied.

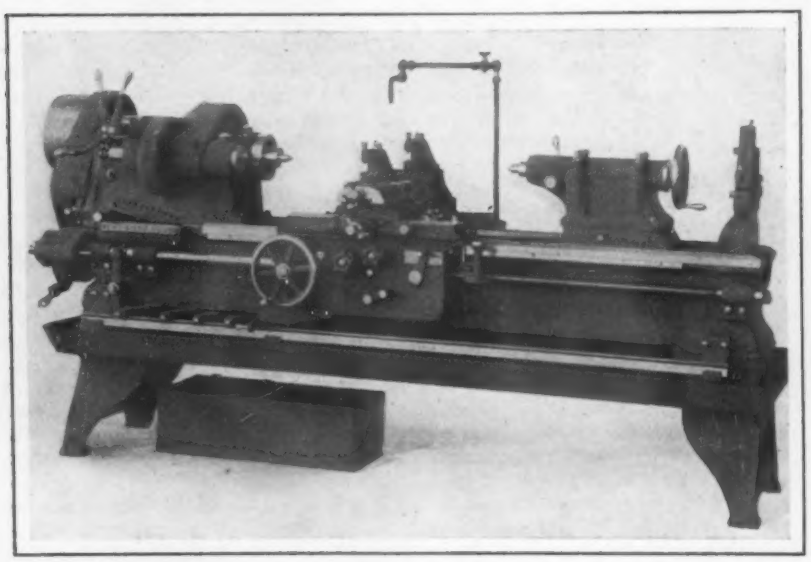


Fig. 1—An 18-In. Belt-Driven Selective Head Lathe with the Manufacturing Equipment of Multiple Stops for Cross and Longitudinal Feeds and Connected Compound and Plain Rests

The entire speed changing mechanism, except the back gears of the headstock proper, is contained in the gear box, which is an independent unit, tongued and bolted to the back of the headstock. It can be removed at any time without affecting the other parts of the head or without removing the motor in the case of a motor-driven tool. The gear box is oil tight and dustproof and the gears run partly submerged in oil at all times. The initial shaft of the gear box, which has either direct or back-geared speed, transmits power to the driven shaft through sliding gears. There are three speed changes to the driven shaft by these sliding gears, which are doubled by the two speeds of the initial shaft. There are four keys formed on the initial shaft, there being no screws or cotter pins inside the gear box, nor any other small parts which might work loose and get into the running gears. All of the transmission gears are of heat treated, chrome nickel steel, and are made with stub teeth of the 20-deg. pressure angle type. After the gears are hardened, the bores are ground concentric with the pitch circles, and finally the gears are mounted on an arbor in a special machine where the teeth are lapped. An extended flanged hub attached to the gear box carries the driving pulley, and thus relieves the driving shaft of belt pull. There are two frictions inside the pulley, one of which drives the initial shaft direct, while the other drives it at a back-geared speed, the ratio between the two being about 2.6 to 1, which is approximately the ratio between the finishing and roughening speeds on any given diameter of work. In this way, all that need be done to increase the speed from a roughing to a finishing cut is to shift the friction lever from one side to the other. This pulley is entirely inclosed at its outer end to retain the oil for the friction surface and a combination oil and belt guard is provided at the inner edge to prevent oil from being thrown on the belt.

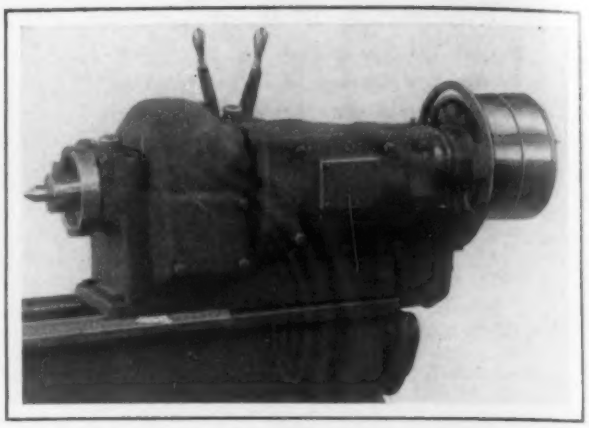


Fig. 2—A Rear View of the Selective Head

The six speeds provided by the gear box are obtained through two vertical levers, conveniently located on the front of the headstock. The lever nearest the operator controls the two frictions in the driving pulleys and stops and starts the spindle and gives fast and slow speeds by moving the lever to the right or left. The other vertical lever shifts the gears and must be moved to the right or left and also in or out to select the required gear. The horizontal lever operates both a positive stepped clutch on

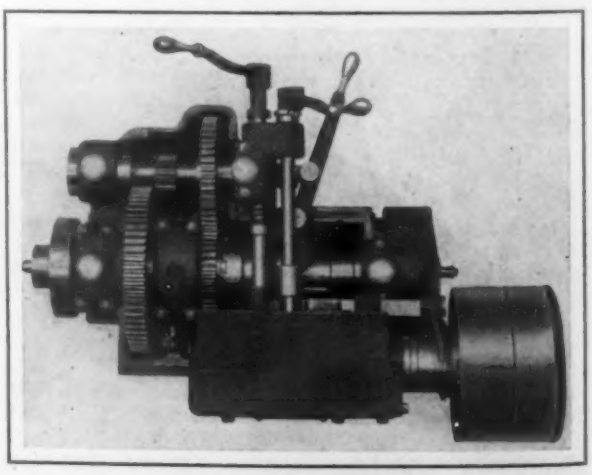


Fig. 3—The Interior of the Selective Head

the spindle and the sliding back gear pinion, which is interlocked with the clutch, so that both cannot be engaged at the same time. A plate on the front of the headstock gives a complete list of all speeds and the position of levers for obtaining them.

The back gearing is located at the front of the headstock, and in lathes ranging from 14 to 36 in., both the shaft and the pinion are cut from a single steel forging. The triple gear is operated by a handwheel which slides the triple gear pinion into or out of mesh with the internal face gear. All the headstock driving gears are of steel, and on all the lathes the gearing is designed to give practically uniform speed progression throughout the entire range.

The spindle is of large diameter and is made from chrome nickel steel. The end thrust is taken against the rear housing by alternate bronze and hardened steel thrust washers, and the spindle bearings are of special composition white metal. The spindle has a double nose, as shown in Fig. 4, consisting of an inner cylindrical portion and an outer cup. The cup is internally threaded to hold the chuck plate in position, and the end is faced to give a very large diameter shoulder against which the face plate is tightened. The inner cylindrical portion of the nose is left blank and extends beyond the outer nose, to form a pilot to receive the face plate or chuck plate. This pilot at all times centers the chuck plate accurately and by centering the bore of the chuck plate before the threaded portion is reached, it is emphasized that the threads engage easily and that the chuck plate may be drawn squarely against the face of the outer nose readily. It is a comparatively simple matter to fit a chuck plate accurately to this spindle, as the bore may be reamed standard size to fit the pilot and the thread is used only to hold the plate in position against the face of the cup. The large diameter of the shoulder afforded by the cup prevents the face plate from becoming stuck to the spindle nose. The spindle noses of lathes from 14 to 20 in. are made to the same standard, so that chucks will interchange from one lathe to another between these sizes, and similarly another standard is used for all lathes from 22 to 36 in.

The bed is made from a close grained iron, and the top is cast against a chill, which it is emphasized, makes it very hard and dense and greatly increases the life and alignment. The carriage is gibbed inside and out, has an oil trough around the front and rear wings, and the extra wide bridge takes a supplementary scraped bearing against the inside horizontal and vertical flat surfaces of the bed. The compound rest has a special square base, so designed that the top slide cannot be overhung, thus giving a solid metal-to-metal anvil support under the tool, and, it is emphasized, preventing any vibration. The apron is self-contained and double walled with the studs supported both front and rear.

The tailstock has floating binders to insure correct alignment of the spindle, which is exceptionally long and is made of tool steel. The barrel extends beyond the face of the tailstock to give a firm support to the spindle at all times. The tailstock is held to the bed by clamping bolts, which are operated from the top of the barrel. In lathes larger than 22 in. a pawl on the base of the tailstock engages a rack in the center rib of the bed to afford a positive brace.

If the machine can be placed near a lineshaft, it can be driven directly through either a straight or quarter turn belt. If, however, the location of the machine is such as to render a countershaft necessary, either a single-speed plain, tight and loose pulley countershaft or a double-friction countershaft can be furnished. For motor drive, any standard make of either direct or alternating current motor of the constant or adjustable speed type within reasonable limits of size and speed can be mounted on the top of the headstock and connected directly through gearing. In this case, a gear which contains the same friction mechanism as the pulley is substituted at the end of the gear box. A casting is mounted at the end of the headstock cover and carries an intermediate fiber gear, the casting serving as a gear guard and cover for all of the motor drive gears. A pinion on the armature shaft meshes with this intermediate gear, thus giving a direct drive to the gear box of the headstock. If desired, a regular belt-driven lathe can be converted into a motor-driven one by mounting an individual motor on the floor or suspending it from the ceiling and connecting it with the headstock pulley directly by a belt. When this type of drive is used, a constant-speed motor is generally employed.

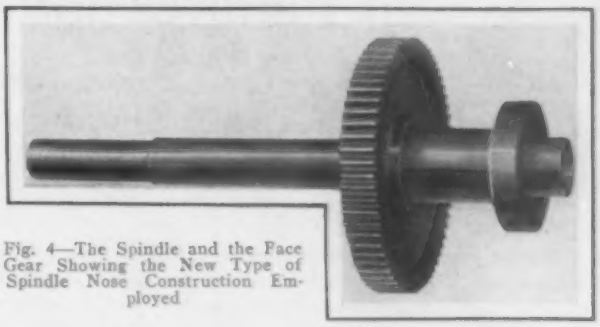


Fig. 4—The Spindle and the Face Gear Showing the New Type of Spindle Nose Construction Employed

To adapt the lathe for turning duplicate work, manufacturing equipment consisting of multiple stops for the longitudinal and cross feeds, connected compound and plain rests and a four-way tool block can be furnished.

Cold-Blast Charcoal Furnace in Mississippi

The Memphis Mining & Mfg. Company, Potts Camp, Miss., is now assembling the materials necessary for the construction of a cold-blast charcoal furnace at Winborn, two and a-half miles southeast of the place named, and located on the main line of the St. Louis & San Francisco Railroad. The furnace is to have a daily capacity of 10 tons. The work is to be rushed, and the company hopes to have the furnace in operation within 90 days. The construction work and the subsequent management of the furnace will be in the hands of J. W. Flannery, of Wisconsin, who has had long experience in the manufacture of cold-blast charcoal iron. The company owns over 16,000 acres of ore and timber land, its ores analyzing 60 per cent. in metallic iron, 1.40 manganese and 0.6 phosphorus. An abundance of hardwood timber is on the property and more can be had within a radius of 50 miles, giving a supply of charcoal for many years. The intention of the company is to make a high-grade iron, to be sold exclusively on analysis. A. C. Jones is president of the company; W. S. Allen, vice-president, and Marion Allen, secretary and treasurer.

Canada Steel Corporation, Ltd.—The United States Steel Corporation has been granted the right to enter Canada and to operate under letters patent of the Dominion of Canada issued to a corporation to be known as the Canada Steel Corporation, Ltd. Its chief office is at Ojibway, Ont., just opposite Detroit. The capital is $20,000,000. A bond issue is expected, but no definite announcement of this has been made by the Steel Corporation.

Bagley, Mills & Co., 50 Church street, New York, American representatives of the Carl Still Company, Recklinghausen, Germany, note the receipt of a number of orders for by-product coke oven and benzol plants, including a recovery plant for 265 coke ovens and a rectification plant for 265 ovens for Gutehoffnungshütte, Oberhausen, Germany; also an order for the reconstruction of a benzol plant for the Workington Iron & Steel Company of England. The company will build 70 regenerative ovens, with benzol recovery plants, for the Societé Anonyme des Hauts-Fourneaux et Fonderies de Pont-a-Mousson, France. The Still high capacity regenerative oven takes a charge of 14 tons of coal. As described in a recent paper of C. A. Meissner before the American Iron and Steel Institute, it embodies the graduated system of combustion and each vertical flue is fitted with duplicate gas nozzles to prevent the choking of the burners with carbon.

A controlling interest in the Slater-Marsden-Whittemore Company, Beloit, Wis., manufacturer of punches and shears, has been purchased by T. C. Hendley. This transfer is coincident with the retirement of George Slater and G. E. Marsden, Mr. Whittemore remaining with the company. Mr. Hendley is well known through his association with the Berlin Machine Works and Fairbanks, Morse & Co., of Beloit and has had an extended experience in manufacturing.

Rail Failures and Their Chief Causes*

Crushed and Split Heads, Square and Angular Breaks, and Crescent Breaks in the Base—Preventive Measures in the Mill

BY M. H. WICKHORST†

Recent years have been active ones in the matter of investigations of rail failures by the railroads, the rail manufacturers and public service bodies, and it is proposed in this paper to consider our present information concerning the nature of the failures and their causes. From the standpoint of the visible condition of the failed rails most of the rail failures may be divided into three classes, as follows:

1. Crushed and split heads;
2. Broken rails (square and angular breaks);
3. Broken bases (crescent breaks).

In addition to these are other failures occurring in smaller numbers, such as "cracked webs" (horizontal longitudinal cracks through the web) and "transverse fissures" (transverse internal cracks in the interior of the head).

Statistics concerning the rail failures occurring in the United States have been published for several years by the American Railway Engineering Association, and in Table 1 are given a few figures covering rail failures for the year ending October 31, 1911.‡ The tons are long tons of 2240 lb. and represent the tons of new rail laid.

It will be noticed from this table that the failures in 1911 per 10,000 tons of new rail laid were 31.0 for Bessemer steel, 20.7 for open-hearth steel, and the average of all rails was 29.0.

On the basis of number of rails, there was one failure per 891 Bessemer rails, one failure per 1234 open-hearth

*A paper read at the Atlantic City meeting of the American Society for Testing Materials, June 25, 1913.

†Engineer of tests, American Railway Engineering Association, Chicago, Ill.

‡Proceedings, Am. Ry. Engrg. Assoc., Vol. 14, p. 392 (1913).

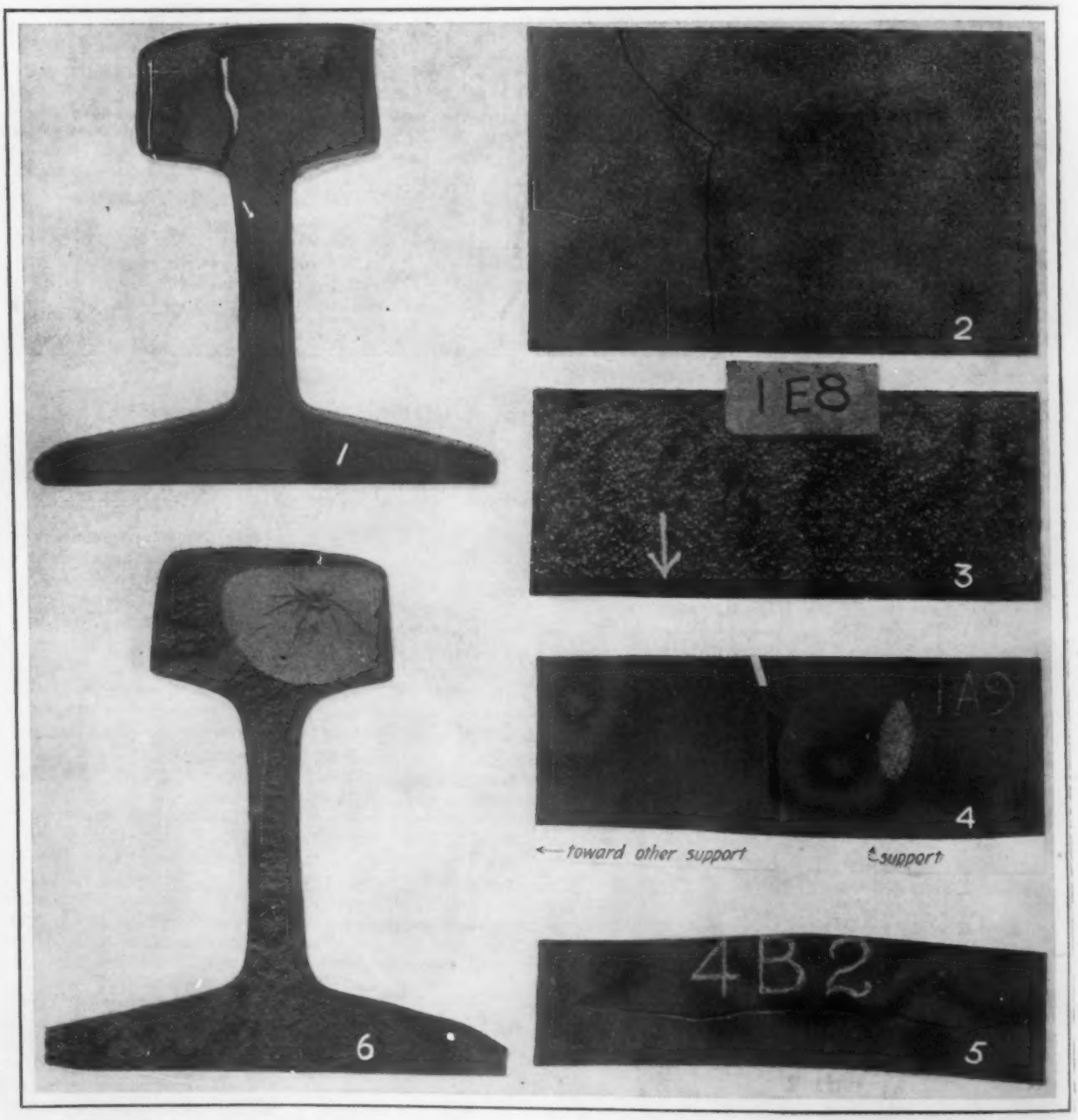


Fig. 1—Sample of Split Head Rail. Fig. 2—Base of a "Broken" Rail, Showing Seam and "Scalloped" Break. Fig. 3—Longitudinal Seam in Bottom of Base of New Rail. Fig. 4—Base in Tension in Drop Test, Showing Seam as Origin of Failure. Fig. 5—Seam in Base Opened under the Top, Causing Base to Split. Fig. 6—"Transverse Fissure" in Head of Rail.

rails, and one failure per 941 rails of both steels. This suggests that open-hearth steel is less liable to failure than Bessemer steel, but on the other hand it is probably true the open-hearth rails were in general of more recent manufacture and probably also contain more of the newer sections. The table cannot therefore be said to be conclusive in its indications in this respect.

The table shows us that there was one failure per 941 rails, but we seem not to have general information of all the failures occurring during the full period of service of a lot of rails. Assuming, for the purpose of forming

Table 1—Rail Failures in 1911

	Bessemer	Open-hearth	Total
Tons of rails represented	10,088,706	2,600,008	12,688,714
No. of rails based on 30-ft. lengths	27,866,348	6,622,736	34,489,084
No. of failures:			
Broken	8,165	1,786	9,951
Head	17,761	2,260	20,021
Web	2,450	515	2,965
Base	2,898	806	3,704
Total	31,274	5,367	36,641
Failures per 10,000 tons:			
Broken	8.1	6.9	7.9
Head	17.6	8.7	15.8
Web	2.4	2.0	2.4
Base	2.9	3.1	2.9
Total	31.0	20.7	29.0
Percentage of failures:			
Broken	26	33	27
Head	57	42	55
Web	8	10	8
Base	9	15	10
Total	100	100	100
No. of rails for each failure	891	1,234	941

some idea of the order of magnitude of the average total failures in a lot of rails, that the average life of rails is 8 years, the total failures per lot of rails would average about one failure per 118 rails or something under one per cent.

While the American Railway Engineering Association statistics above referred to indicate an improvement in the general failure performance from year to year in the last three years that they have been kept, we still hear of occasional lots rolled in recent years that give very poor service. As an example may be mentioned a lot of 2500 tons of 80-lb. A. S. C. E. Bessemer rails rolled in September, 1909, and placed into track in October, 1909. Up to May, 1912, or in a period of service of 2½ years, there were 510 failures classified by the trackmen as follows:

Crushed head and flow of metal	243
Split head	93
Split web	89
Broken	81
Broken base	4
Total	510

This would be 2040 failures per 10,000 tons; or, figured on the basis of 30-ft. lengths, there would be one failure in each 13.7 rails in 2½ years from the time the rails were put into service. I am advised that since May, 1912, other rails have been removed from track and still others at this writing (March, 1913) are developing a condition that will necessitate their removal. Thus far about 7 per cent. of this lot of rails have been removed from service on account of failures, mostly of the head, and it seems probable that finally the number may amount to 10 per cent. or more. This type of failure, as will be explained, is to be attributed to the interior condition of the ingot from which the rail was rolled, described as segregation and its accompanying conditions.

Crushed and Split Heads

Head failures are the most numerous and most of these may be described as crushed or split heads. This failure consists of an internal crack in the head running lengthwise of the rail anywhere from a foot or two to several yards in length. The external appearance may show only a crushing of the head; but when broken, the rail will show a crack in the interior of the head running lengthwise of the rail. A specimen of this type of failure is shown in Fig. 1. This kind of failure is confined almost entirely to metal showing considerable internal segregation of carbon, phosphorus and sulphur, attended more or less with laminations and slag seams. Under wheel loads, the top of the head flows sideways and if the interior metal cannot likewise flow sideways due to internal flaws or due to brittle material in the interior, it develops a crack which grows and later forms a split head, the crack generally coming to the surface at the under side of the head at its junction with the web. Frequently the crack extends downward into the web and comes to the surface at the side of the web, and then the trackman is apt to report the failure as a web failure, whereas in reality it was a head failure.

Split heads may thus be said to be due to lack of transverse ductility in the interior of the head, due mostly to segregation.

Square and Angular Breaks

The next largest class of rail failures is that called "broken" rails, including square and angular breaks; that is, the rail breaks through the whole section more or less vertically. This type of failure is most predominant in winter, particularly in severely cold weather, and may be termed "winter disease" of rails. The severe weather of 1911 and 1912 brought out a very abundant crop of such failures on the northern roads. An examination of the fractures of such rails shows that the fracture is upward through the section; that is, it starts from the base, and the rails also show longitudinal cracks or seams at the bottom of the base. H. B. MacFarland, engineer of tests, Atchison, Topeka & Santa Fé Railway, has made an interesting report* in which he shows that most "broken" rails were accompanied by half-moon base fractures, which observation has also resulted from other investigations. Probably the most prominent feature of the appearance of most "broken" rails is what may be called the "scalloped" fracture across the bottom of the base; that is, the fracture is not straight across the base but one side is concave or re-entrant with a sharp corner, while the other side is pointed and dovetails into it. The concave side of the fracture generally shows also a seam at the bottom of the base. A view of the bottom of a typical "broken" rail is shown in Fig. 2.

Seams in the Base of the Rails

Rails frequently contain longitudinal surface seams, and in this connection a study of the behavior in the drop test of a rail containing seams in the bottom of the base is important. These base seams vary in depth from a hundredth to a tenth of an inch and occasionally deeper. Fig. 3 gives a view of the vertical fractured surface of a piece of flange broken off from a new rail, showing a deep seam at the bottom of the base.

When tested in the drop test in the usual manner, the rail ordinarily breaks at or near the place where hit by the tup due to exhaustion of the longitudinal ductility of the part in tension. Occasionally, however, when tested with the base in tension—that is, with the base resting on the supports—the fracture occurs near one of the supports. A view of the base of a rail broken in this manner is shown in Fig. 4. This was a 100-lb. rail broken in the drop test with the base in tension, supports 3 ft. apart, and given one blow of a 2000-lb. tup from a hight of 20 ft. The impression left on the base by the support was chalked to show up more clearly in the illustration and it will be noted that the permanent impression was confined mostly to the middle third of the width of the base. It will be noted that the pressure of the rail on the support caused some side spread of the base at this place, which in turn opened up a seam. A piece of the flange broke, and a fracture occurred through the whole section 3½ in. from the support, as a secondary break. The failure of this rail occurred long before the longitudinal ductility was exhausted and may be considered as due to insufficient transverse ductility at the bottom of the base because of the presence of seams.

When tested with the head in tension, the result is of a similar nature if there is a seam in the base at the place where struck by the tup. Fig. 5 shows the base of a rail tested in this manner. Here again the blow of the tup caused a side spread of the metal of the base where struck, which in turn opened up a seam causing a failure from the top side, not due to exhaustion of the longitudinal ductility of the head.

About 10 per cent. of all rail failures, according to Table 1, are base failures, mostly half-moon or crescent-shape pieces broken out of the flange. These occur mostly at ties and appear also to be largely attended with seams

*Proceedings Am. Ry. Engrg. Assoc., Vol. 14, p. 315 (1913).

in the base. The origin of the failure in this type, as with "broken" rails, thus appears to be the seams in the base and these two types should therefore be classed together as regards cause of failure.

The "Oval Spot" in the Rail Head

A type of failure that has attracted considerable attention in recent years is the "transverse fissure" or "oval spot" in the interior of the head, an example of which is shown in Fig. 6. This type was first brought into prominence by a report by J. E. Howard, of the Bureau of Standards, on a rail ascribed as the cause of a bad wreck on the Lehigh Valley Railroad at Manchester, N. Y., on August 25, 1911. C. D. Young, engineer of tests of the Pennsylvania Railroad, has also presented an interesting report of his investigations of some failures of this type that occurred on the Pennsylvania Railroad.* While these reports contain valuable data and good suggestions, the writer feels that a full explanation of the cause of this type of failure has not as yet been worked out, which necessarily must precede effective action for remedying the trouble. This kind of failure is occasionally followed with disastrous results, but fortunately occurs only in small numbers except perhaps under some special conditions.

Another type of failure that constitutes a small percentage of the total failures is the "cracked web," in which the web is cracked through from side to side running lengthwise of the rail; but here again the writer is not aware of a final explanation having been worked out.

Service Conditions as Causes of Failures

Wheel loads have been increasing ever since the beginning of railroads and the tendency seems to be to still further increase them, at any rate as regards the average wheel loads. The heavy wheel loads have been given as the cause of rail failures. While it is true that the loads are heavy, it is also true that failures are confined to what may be called defective rails, and that most rails stand up under the service. The failures classified as crushed and split heads have for some time been recognized as due to defective metal; and, although "broken rails" eluded us for a while, as attributable to the material, we may say these also are to be ascribed to defective material although not defective metal.

Bad counterbalance, flat wheels and other abnormal conditions kink good rails and throw them out of line, although, of course, the defective rails are more promptly found by such abnormal conditions. A rail tested in the drop test will ordinarily stand a bend of several inches in a span of 3 ft. Of course the railroad that persists in bending and kinking its rails will soon have an unrideable track for satisfactory service. It seems to be true that such matters as weight of rail or design of section are of but small importance in the matter of rail failures, but are rather matters more concerning the rideability of track and cost of maintenance.

Remedies

The above part of this paper deals with diagnosis and I think we now have arrived at a point where we may feel considerable confidence that we have the correct diagnosis of the cause of most of the rail failures. About fifty per cent. are ascribable to low transverse ductility of the interior of the head due to segregation (and its attendant conditions) and traceable to the interior condition of the upper part of the ingot. About forty per cent. are ascribable to low transverse ductility at the bottom of the base, due to the presence of longitudinal seams at the bottom of the base, and probably the origin of these seams is to be looked for in the rolling of the steel. This leaves about ten per cent. not yet diagnosed. What remedies will finally be applied I, of course, cannot say, but below are given some thoughts as to the directions in which betterments are to be looked for.

According to Table I, 55 per cent. of the rail failures of 1911 were head failures and 8 per cent. were web failures, and as already indicated most of these may be classified as crushed and split heads, attributable to excessive segregation in the interior of the ingot, together with the conditions which ordinarily attend such excessive segregation, such as sponginess and an abnormal softness of the steel at the outer part of the rail section around the segregated region of the rail. Thus, it appears that the remedy for about 50 or perhaps 60 per cent. of rail failures is to be looked for in a reduction of segregation below the point where it causes a brittleness of the interior metal of the rail. The condition of sponginess is worst at the top end of the rail bar, but the segregation reaches its worst condition at a varying distance from the top end—ordinarily about 15 per cent. of the weight of the ingot from the top end of the ingot—and varies in degree from harmless segregation to a condition sure to result in bad service of the rail. It seems to be well established that well-deoxidized, quiet-setting steel has not the concentrated segregation found in other steel and is free from sponginess, but the central pipe extends farther downward into the ingot. The main cause for head failures is, however, the excessive segregation, and to avoid this requires a sufficient discard from the top of the ingot, or steel treated with sufficient silicon, titanium or aluminum. It is usual for rail specifications to put a maximum limit of 0.20 per cent. on silicon, but the writer's work indicates it is necessary to have 0.25 per cent. or more silicon in the steel in order to obtain its full influence in reducing sponginess and segregation. When titanium is used, 0.1 per cent. or more of metallic titanium is probably the proper amount with which to treat the steel. Talbot recommends aluminum used in amounts of 2 oz. per ton or about 0.006 per cent.

It seems that we must come to a well-deoxidized dead-quiet-setting steel, but then we have a deep pipe to deal with when the steel is cast in the usual manner into ordinary open-top iron molds. There has been recently, and still is, considerable experimental activity toward overcoming this condition and the next few years may see a practicable and economical solution of this problem of pipe, available on a larger working scale. Hadfield recommends a sand top to the mold and special arrangement to keep the top metal liquid till the bottom of the ingot has set. Talbot recommends a pre-rolling or liquid compression, and a number of other means have come to public attention lately. Possibly, also, some improvement may be obtained by closer attention to the details of the present casting process; or, again, satisfactory uses may be found for the upper part of the ingot for other purposes. The conclusion seems to be emerging, however, that for rails, a well-deoxidized, quiet-setting steel must be used, in order to avoid excessive segregation and to obtain rails with a uniform hardness at the wearing surface in the several rails of an ingot. A solution of the ingot problem means the prevention of about half of the failed rails of the country.

As indicated above, about 40 per cent. of the rail failures are traceable to a longitudinal seam at the bottom of the base. The seam does not show on the new rail and cannot be discovered by inspection, but shows up when the failed rail is examined. We have very little satisfactory information as to the origin of these seams (although they seem to be produced in the rolling), but the matter is being studied more critically and we hope in the course of time to have more satisfactory knowledge of the subject.

In conclusion, we may say (considering the number of failures) that about 50 per cent. of the rail failure problem consists of obtaining sound metal of fairly even composition, and about 40 per cent. consists of so rolling the metal into rails as to avoid seams in the bottom of the base. The earnest activity and the co-operation of all interests to produce improvement in the matter of rail failures is such that we may well be hopeful of the future. The steel mills have freely offered the facilities of their works to the railroads for experimental work, and I in particular wish to acknowledge the uniformly kindly treatment accorded me in my work at the various mills. As a still further improvement of the general situation, I would urge upon the metallurgists and other officers of the steel mills that they be more forward in publicly presenting the results of their studies and investigations.

*Proceedings Am. Ry. Engrg. Assoc., Vol. 14, p. 413 (1913).

Another Open-Hearth Steel Plant at Cleveland.—The Cleveland City Forge & Iron Company, Cleveland, Ohio, is planning the erection of an open-hearth steel plant for the manufacture of billets used in its forge shop. It is stated that the company will manufacture steel only to meet its own requirements. Plans for the plant are being prepared by the United Engineering & Foundry Company, Pittsburgh, Pa.

Growth of the Goldschmidt Companies

A Unique International Development in the Metal Industry from German Beginnings

Some data have been made public recently concerning an unusual undertaking in the metal industry, which, starting in Germany, has developed international relations—the Goldschmidt group of enterprises with headquarters at Essen a.d. Ruhr.

The chemical works of Th. Goldschmidt were originally started in 1847 at Berlin, Germany, for the manufacture of chemicals for cotton printing, and particularly of tin components, which still remain a specialty. During the period of 1889-1891 a plant was built at Essen which now embraces a tin smeltery, the chemical works and a department for the manufacture of alumino-thermic products. In the tin smeltery foreign tin ores, notably from Bolivia, are smelted and the metal produced is marketed. In the chemical works tin scrap and old cans are detinned, the scrap iron being sold to steel works while the tin chloride is sold to silk dyers, covering the greater part of the European demand. The alumino-thermic department produces low-carbon metals like chromium, manganese, ferrotitanium, ferromolybdenum and ferrovanadium for the steel trade and the well-known "thermit," which in Europe is chiefly used for welding street rails, over 5000 miles of track having been laid with welded rail, while in the United States it has been widely employed in general welding.

In 1911 the old firm was converted into a stock company, the Th. Goldschmidt Actien Gesellschaft, with a capital of 10,000,000 marks. At that time Dr. Karl Goldschmidt and Dr. Hans Goldschmidt turned in the property, with the exception of their participation in foreign sister companies, valued at 6,600,000 marks for 6,000,000 marks of stock and the remainder of 4,000,000 marks was sold at 110. The prospectus has now been issued for the increase in the capital stock by 5,000,000 marks to 15,000,000 marks, of which 1,800,000 marks has been offered to the public at 185.

The increase in the capital stock is to be used to the extent of 800,000 marks at 110 to take up the stock of the chemical factory Gernsheim-Heubruch A. G. at Gernsheim, at the rate of 4000 marks Goldschmidt stock for 5000 marks Gernsheim-Heubruch stock. Further, 3,000,000 marks of the new stock is to be issued at 110, rated as one-quarter paid up plus the premium, to Drs. Karl and Hans Goldschmidt for $969,500 common and $90,000 preferred stock of the Goldschmidt Detinning Company, of New York, $119,100 common and $75,000 preferred of the Goldschmidt Thermit Company, of New York, and 500,000 crowns of the Austrian Goldschmidt Company, of Aussig, Bohemia. In full settlement of the purchase price of 3,300,000 marks the Goldschmidts were paid in cash 2,250,000 marks. The remainder of 1,200,000 marks of new stock was taken over by the Goldschmidts at 170 and paid for at one-quarter of par plus premium.

The parent company controls participation in the English group which includes Batchelor & Co., Ltd., Th. Goldschmidt, Ltd., Thermit, Ltd., London Elektron Works, Ltd., and Australian Thermit Company, which yielded a profit of 43,688.25 marks in 1910, of 223,671.60 marks in 1911, and of 202,618.99 marks in 1912. The French group lost money in 1910 and 1911 but made 27,689.90 marks in 1912. The American group including the Goldschmidt Chemical Company, the Goldschmidt Detinning Company and the Goldschmidt Thermit Company, yielded 106,410.92 marks in 1910, 290,189.73 marks in 1911, and 614,087.36 marks in 1912, thus showing a rapid development. These participations are now on the books at 5,099,856.15 marks and would have yielded on the book value, 12 per cent. in 1910, about 12.25 per cent. in 1911 and about 16 per cent. in 1912.

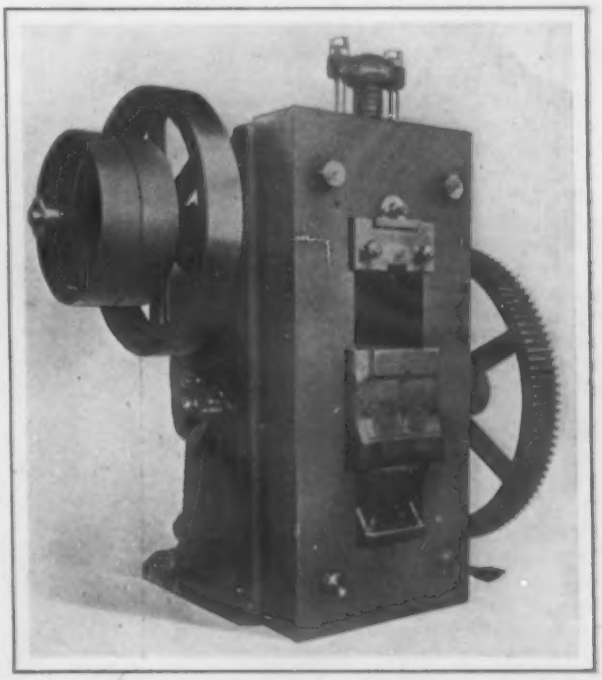
The profits of the old company in 1912, deducting general expenses and interest, were 2,084,442.48 marks, of which 631,716.36 marks was written off for depreciation of property and plant. There was paid 6 per cent. dividend on 7,000,000 marks paid-up capital, or 420,000 marks, and 6 per cent. on 10,000,000 total capital or 600,000 marks—a total of 1,020,000 marks, while 200,000 marks was paid into special reserve.

A Compact Heavy Knuckle Joint Press

For coining, embossing and swaging operations, where it is necessary that the metal worked flow under pressure, the Max Ams Machine Company, Mount Vernon, N. Y., is making a new heavy-knuckle joint press. The application of the knuckle-joint principle, it is emphasized, gives a slow, powerful movement at the end of the stroke, and this, together with an effort to make the press as compact as possible, with a view to occupying the minimum amount of floor space, were the objects sought in its design.

The frame receiving the pressure is a steel forging which is bolted securely to the cast-iron one that carries the driving mechanism. Steel castings are used for the toggle links and hardened and ground tool steel is used for the pins and seats, which are placed below the table. In this way lost motion is taken up by the weight of the parts, and it is pointed out that this construction possesses the additional advantage that oil cannot run upon the dies and the work. Adjustable bearings serve to guide the table.

A steel wedge, adjusted by a screw, which has a collar graduated to 0.001 in. controls the adjustment for the dies and the pressure applied to the work. This arrangement, it has been found, enables an accurate record of the setting of the dies to be kept by the operator for repetition work.



A New Type of Compact Heavy Knuckle Joint Press Designed Especially for Coining, Embossing and Swaging Operations

The clutch used in the press is of the sliding key type and special emphasis is laid upon the fact that its construction prevents backlash. Three engaging points are provided.

The following table gives the principal dimensions and specifications of the press illustrated:

Width between uprights, in.	14
Largest die space, in.	12
Length of stroke, in.	1½
Adjustment, in.	⅜
Pressure exerted, tons	600
Diameter of flywheel, in.	45
Width of flywheel, in.	6
Weight of flywheel, lb.	1,100
Ratio of gearing	1 to 8½
Diameter of tight and loose pulleys, in.	6
Over-all hight, in.	93
Weight, lb.	19,000

While the figures in the above table represent the dimensions of the presses, as generally built, it is possible to change some of them to suit the requirements of individual cases.

Determination of Oxygen in Iron and Steel*

Shortcomings of the Ledebur Method and Its Modifications—Oxygen as a Retarder Rather Than Accelerator of Corrosion

BY WILLIAM R. FLEMING.†

It is a lamentable fact that we have no trustworthy method for the determination of oxygen in iron and steel. At the present time the Ledebur method is the only one used by chemists to any extent. In the writer's opinion this method is little better than no method at all, for it is both inaccurate and misleading. In the cases of steel and wrought iron the method is practically worthless, for most of the oxygen in steel is in combination with manganese, silicon, chromium, aluminum, etc., and much of the oxygen in wrought iron is in the silicates and phosphates of the cinder. It is well known that oxygen united with these elements is not obtained by the Ledebur method. Yet in spite of this some chemists waste their valuable time attempting to determine oxygen by the Ledebur method.

Several companies are now manufacturing ferrous metals in open-hearth furnaces that approach closely to pure iron. These metals are practically free from manganese, silicon and other elements whose oxides will not decompose in hydrogen. Consequently the oxygen in these metals is practically all in combination with iron, and since all oxides of iron give up their oxygen when ignited in hydrogen it follows that here the Ledebur method must have some value. Although in this special class of ferrous metals the Ledebur method gives results nearest to the truth, at the same time I wish to show in this paper that even here the method has a very limited value.

Heating in a Vacuum in Presence of Carbon

A method outlined by Walker and Patrick at the last Congress of Applied Chemistry may eventually prove a reliable means of determining oxygen in steel. By this method the total oxygen in the steel is obtained as carbon monoxide by heating to a high temperature, in the presence of carbon, in a vacuum. The great objection to this method is the extremely large blank that has to be deducted. However, it is undoubtedly far superior to the Ledebur method and it is to be hoped that the originators of this unique method will bring it to a degree of accuracy which will enable us to class it with the exact methods we have for carbon, manganese, etc.

In republishing the Ledebur method a few years ago, Dr. A. S. Cushman deprecated the fact that American chemists had failed to give sufficient attention to the determination of oxygen in steel, and that text books on steel analysis had failed to include a method for it. This attitude of American chemists is not surprising, for they undoubtedly realized that there was no method sufficiently accurate to justify a description in text books, not even to justify the wasting of valuable time in the laboratory. The fact that the Ledebur method is not described in any work on analytical chemistry except that of Ledebur himself surely has some significance, especially when we consider that Ledebur published the method over 30 years ago. If it had any great value it would have found its way into some of our standard analytical books.

For the purpose of this paper I will take for granted that when analyzing ferrous metals free from difficultly-decomposed oxides, the Ledebur method obtains all of the oxygen, provided the sample is sufficiently divided. I would remind you, however, that in some instances considerable aluminum is used as a deoxidizing agent in place of ferromanganese, and in these cases there is undoubtedly some aluminum oxide in the metal, which, of course, would be untouched by ignition in hydrogen.

The Taking of the Sample

It is a surprising fact that all writers who have described methods for the determination of oxygen have failed to discuss the most important feature, namely, the taking of the sample. It is absurd to waste time determining an element unless we know that the drillings we are analyzing are representative of the entire mass. We have very little trouble securing representative samples of drillings for the determination of carbon, manganese, etc., and most chemists seem to take for granted that representative samples for oxygen can be secured in the same way. This is not true. The carbides, sulphides and phosphides of iron and manganese exist in a state of solution and are fairly uniform in well-made steel. The oxides of iron do not exist in this intimate relation with the metallic body; they are mere mechanical impurities and arrange themselves throughout the metal according to mechanical laws. During slow cooling of liquid metal in ingot molds, the oxides travel slowly inward and upward, leaving the solidified ingot irregular in oxygen. On this account it is difficult, if not almost impossible, to get drillings for analysis which will represent the true oxygen content of the entire mass. Certainly one or two pieces taken at random from a shipment will give the purchaser no idea of the true percentage of oxygen.

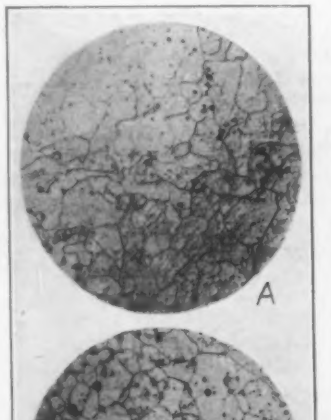


Fig. 1—Bar No. 1

Fig. 2—Bar No. 2
A, first ⅛-inch. B, center.

Outside of Bar Lowest in Oxygen

I have examined a great number of ingots of nearly pure ferrous metal and in every case I have found the oxygen very irregularly distributed, the outside invariably being lower in oxygen than the center, and the lower portions of the ingots invariably containing less than the upper portions. It did not matter whether the metal contained little or much oxygen; the variation existed just the same.

Ingots weighing over 5000 lb. were rolled out into sheet bars 1 in. thick and 8 in. wide. After cutting off a good "crop" at the upper end, sample No. 1 was cut, then samples cut at eight equal distances from top to bottom. Two oxygen determinations were made on each sample by the Ledebur method, one from the drillings cut from the first ⅛ in. below the surface, and one from drillings cut from the center. The results from an ingot containing considerable oxygen are given in Table 1.

*A paper read at the Atlantic City meeting of the American Society for Testing Materials, June 25, 1913.

†Chief chemist, Andrews Steel Company, Newport, Ky.

Table 1.—Percentage of Oxygen

Bar No.	First ¼ in. in bar. "Outside"	Fourth ¼ in. in bar. "Center"
*1	0.047	0.098
2	0.032	0.107
3	0.052	0.088
4	0.055	0.096
5	0.023	0.074
6	0.047	0.090
7	0.022	0.041
†8	0.036	0.062

*Near top. †Near bottom.

Figs. 1 to 8 show photomicrographs of section corresponding to the location from which the above drillings were taken. Table 1, together with the photomicrographs, shows the great difficulty in obtaining representative drillings for oxygen determination.

I am convinced that the analyses of one or two pieces cannot be of any value. Furthermore, I am convinced that unless the analyst knows the location of the piece, whether it came from the top, middle, or bottom of the ingot—in other words, unless he knows the history of the sample—the result he obtains will be of little real value. From this it follows that the manufacturer is the only one that can get a true (approximately true) idea of the amount of oxygen contained in all the pieces rolled from an ingot or from a whole heat.

Oxygen and Corrosion of Sheets

Great importance is being attached by some companies to the amount of oxygen contained in sheet metal, it being claimed that this element is an accelerator of corrosion. In support of this view meaningless laboratory tests and vague theories are advanced. As a matter of fact there is absolutely no evidence which even indicates that oxygen is an accelerator of corrosion. On the contrary, we have an abundance of testimony pointing in the opposite direction. We know that wrought iron resists corrosion much better than steel and we know that most wrought iron is polluted with oxygen. We know that the "piles" are made of muck bars covered with thick coatings of iron oxide and we know that this iron oxide is present in the finished sheet. The very method of manufacture itself produces metal high in oxygen. This evidence, produced by years of practical experience, is infinitely more convincing than the most ingenious laboratory test or the most subtle theory.

While I do not defend wrought iron and while I believe that metal can be made in the open-hearth furnace which will be even more rust-resisting than wrought iron, at the same time I believe we are unfair when we compare percentages of oxygen in the two metals and use the high percentage in wrought iron to lead prospective buyers away from it. It is my opinion that, if the truth were known, oxygen retards rather than accelerates corrosion.

Cushman's Modification of the Ledebur Method

Dr. A. S. Cushman published the Ledebur method in the Journal of Industrial and Chemical Engineering, Vol. 3, p. 372. He used a gas blast furnace which simultaneously heated the preheating and ignition tubes. While there is no objection to this if the hydrogen is perfectly free from oxygen, there is a decided objection to it if the hydrogen contains oxygen. In this case all of the oxygen that is in the apparatus, at the time a certain temperature is reached, between the preheating tube and the weighing apparatus, is weighed and counted as oxygen in the steel. It is true that the running of a blank may correct this error to some extent, but there is no way of knowing the exact error that is introduced in this way with every determination. The best, and by far the safest, arrangement is to employ a preheating furnace, and the furnace best for this purpose is an electric resistance furnace. This can be made by anyone with little work and almost no expense. A gas furnace for blast is best for ignition of the samples.

Fig. 3—Bar No. 3

Fig. 4—Bar No. 4

Fig. 5—Bar No. 5
A, first ¼-inch. B, center

The train used by the writer is shown in Fig. 9. The hydrogen is generated by stick zinc and dilute hydrochloric acid. By placing 15 lb. of stick zinc in the generator it need not be disturbed for over one hundred determinations. The great advantage of this is apparent. R and R_1 provide constant pressure and improve the apparatus 100 per cent. over that with a Kipp alone. The weighing apparatus is weighed filled with hydrogen. Aspirating with air before weighing is not only a waste of time but introduces more error than it corrects. If the weighing tube has perfectly ground stoppers it should be weighed filled with hydrogen; if not, it is best to weigh filled with air. To test the tube fill it with hydrogen and weigh against a tare. Weigh again at equal intervals for several hours. If it gains in weight it should be used for some other purpose. In ordering these tubes perfectly ground joints should be insisted upon.

If the apparatus is in good order constant blanks of 0.0015 gram will be obtained, whether the atmosphere be hot or cold, moist or dry.

The McMillen Modifications

R. H. McMillen has recently published the Ledebur method* claiming the following features as improvements: use of electric resistance furnace for ignition of the sample; use of porcelain boats; use of pyrogallic acid in the train; weighing of the absorption tube filled with hydrogen. Dr. Cushman criticised the article on the ground that no contribution had been made to the older method. The stand taken by Cushman is undoubtedly taken by all chemists who have had experience with the Ledebur method, for it is difficult to see wherein McMillen has made the slightest improvement in the method. As Cushman has said, the electric furnace is not adapted to this method because it requires too much time heating and cooling. The first train set up by the writer, over five years ago, contained the two improvements claimed by McMillen, namely, two resistance furnaces and pyrogallic acid. The second electric furnace, for heating the sample, was abandoned a few days later for reasons pointed out by Cushman. A short time afterward I learned that the use of pyro was unnecessary and abandoned that also.

As to the other improvements claimed by McMillen, the use of porcelain boats and weighing of the tube filled with hydrogen, little need be said. Any chemist, in his first experiments with the method, would naturally use porcelain boats.

*The Iron Age, January 30, 1913, p. 308.

Cushman criticises the use of porcelain on the ground that it absorbs moisture. This criticism is slightly overdrawn, for, as McMillen has said, with little precaution no error will be introduced in this way. The most important criticism made by Cushman was on the practice of weighing the absorption tube filled with hydrogen. He attacks this practice on the ground that hydrogen diffuses through "air-tight" stoppers. On this point I beg to disagree with Dr. Cushman. I have been weighing absorption tubes filled with hydrogen for over five years and wish to say emphatically that hydrogen does not diffuse through the stoppers if they are ground as they should be. If the chemist will take the time to test the U-tubes to satisfy himself that the stoppers are well ground he need have no fear of hydrogen diffusing through the stoppers.

The following experiment on this point may be of interest to some: A U-tube, loaded with glass wool and phosphoric acid, was filled with hydrogen and placed in an ordinary desiccator. It was weighed at intervals for five months and at the end of five months it weighed exactly the same as on the day it was filled with hydrogen.

Oxides That Remain in the Metal

In his article McMillen called attention to the well-known fact that the Ledebur method obtains only that oxygen which is combined with iron, and that it fails to decompose the oxides of manganese, silicon, etc. Replying to that, Dr. Cushman states that it is not necessary to know the amount of oxygen combined with manganese, silicon, etc., because the amount of iron oxide measures the extent to which the metal has been over-oxidized in the furnace. It is difficult for the writer to understand the point of view taken by Dr. Cushman. Practically all basic steel at the time of tapping contains from 0.15 to 0.25 per cent. of manganese. Is it Dr. Cushman's opinion that none of this manganese is combined with oxygen? From our practical knowledge of the affinity of iron and manganese for oxygen we must assume that the small amount of oxygen usually found in steel at the time of tapping is in combination with manganese, or at least we must assume that manganese has its share of the oxygen. For the sake of argument we will assume that all of the oxygen in the metal at the time of tapping is in combination with iron, and that the metal contains 0.10 per cent. of oxygen. To deoxidize this highly over-oxidized metal ferromanganese and ferrosilicon are added in the ladle. If enough of these deoxidizing materials has been added, and if they accomplish the purpose for which they were added, then the metal will be free from iron oxide and will contain a certain amount of manganese and silicon oxides which could not find their way to the slag. In this ideal case would not the amount of manganese oxide and silica bear some relation to the amount of oxidation that had taken place in the furnace?

In the manufacture of pure open-hearth iron the metal, at a certain stage in the process, contains from 0.06 to 0.10 per cent. of oxygen. If tapped at this stage, without addition of any deoxidizing agent, no difficulty will be experienced in rolling it. If, however, ferromanganese and ferrosilicon are added (say 200 lb. of each) in the ladle the metal will crumble to pieces in the rolls. This is due to the fact that the manganese and silicon rob the iron of its oxygen and in some mysterious way render the metal extremely red short. If these oxides had found their way to the slag, the metal, in all probability, would have been improved. This is mentioned to show that the oxides of manganese and silicon, formed on the addition of ferromanganese and ferrosilicon to over-oxidized metal, do not find their way to the slag, but remain to a great extent in the metal.

Fig. 6—Bar No. 6

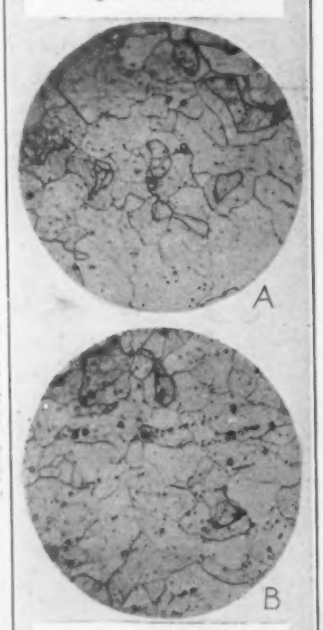


Fig. 7—Bar No. 7

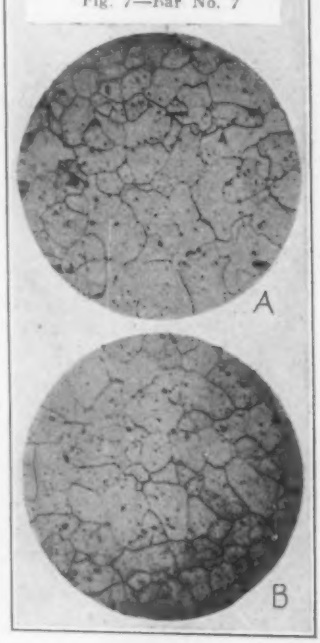


Fig. 8—Bar No. 8
A, first ½-inch. B, center.

Induction Motor Safeguarding

To eliminate the large drop of potential in the supply circuit which occurs when large squirrel cage induction motors are started, the General Electric Company, Schenectady, N. Y., has developed a new type of starting compensator. This device, which has been on the market for some time, consists of an auto-transformer with taps for obtaining a reduced potential and suitable mechanism for connecting the motor to these taps momentarily for starting, and then disconnecting it from the taps and throwing it directly on the supply circuit when full speed has been attained. The contacts are immersed so as to take advantage of the break under oil in preventing burning of contacts and disturbances in the circuit. The taps are brought out so as to provide a number of derived voltages sufficient for all conditions of service. In compensators for motors from 7½ to 18 hp., there are three taps, giving 50, 65 and 80 per cent. of the line voltage, with line currents that are 25, 42 and 65 per cent. of the circuit that would be taken by the motor if no compensator were used. The compensators for motors larger than 18 hp. have four taps, giving potentials ranging from 40 to 85 per cent. of the line voltage and currents of from 16 to 72 per cent. In the three-phase compensator, the three coils are connected in Y, the supply circuit to the free ends of the coils and the connections for starting the motor to the taps. In the two-phase compensators, a coil is connected across each phase of the supply circuit, while the starting connections for each phase are connected to one end of the coil and a tap.

Safety Devices Supplied

In the compensator a latch, engaging a lug on the operating handle, prevents the switch from being closed in the running position until it has been first thrown into the starting one. When the lever is thrown from the starting position toward the running one, the lug on it strikes a shoulder on the latch, throwing it upward and permitting the lever to pass to the running position, if the throw is made quickly enough, but stopping it in the off position if the lever does not pass that point before the latch has time to fall and engage the lug.

The compensator cannot be left in the starting position when the motor is not in use, for the springs in the mechanism return the contacts to the off position, if

the handle is released or thrown to the running one. When the switch has been thrown to the running position, an arm at the opposite side of the compensator and on the end of the operating shaft, engages with the locking end of a lever, so as to hold the switch in the closed position. The tripping end of this lever is connected to the core of the no-voltage release coil, the circuit of which is connected to the motor side of the supply mains. The weight of this core is sufficient, so that when the voltage fails, and the coil is de-energized for the core to drop and strike the end of the lever with sufficient force to throw up the locking end and release the holding lever, thus permitting the contacts to be opened by the springs.

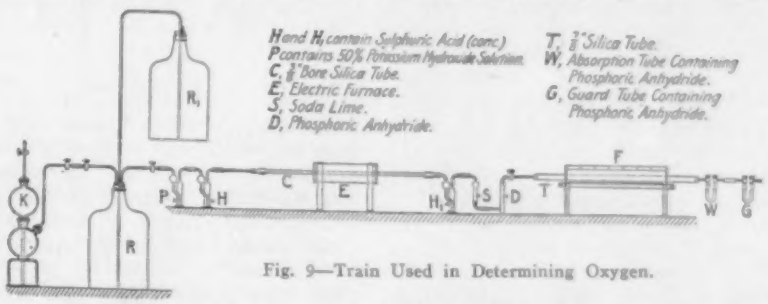


Fig. 9—Train Used in Determining Oxygen.

The line of compensators includes ones for all potentials up to and including 3000 volts, with a line current of 400 amperes at 550 volts and 200 amperes at 3000 volts. They are made in two types, the suspension and the floor styles, and are designed to bring the motors up to approximately full speed within 1 min., after the switch is thrown into the starting position.

Guarding Against Overloads

To guard the motor against injurious overloads, the compensators for 110 to 550 volt induction motors have cartridge type fuses mounted on a slate base and separated by barriers, while for voltages of from 1040 to 3000, the compensators have series, time limit, oil dashpot relay panels inclosed by a dustproof sheet iron cover which shut down the motor if the overload stays on for a greater interval of time that that for which the dashpot is set. These panels operate through a solenoid which opens the circuit of the no-voltage release coil and shuts down the motor in the same way as if the supply circuit had been interrupted. If desired, time limit overload relays can be provided for all sizes of compensators.

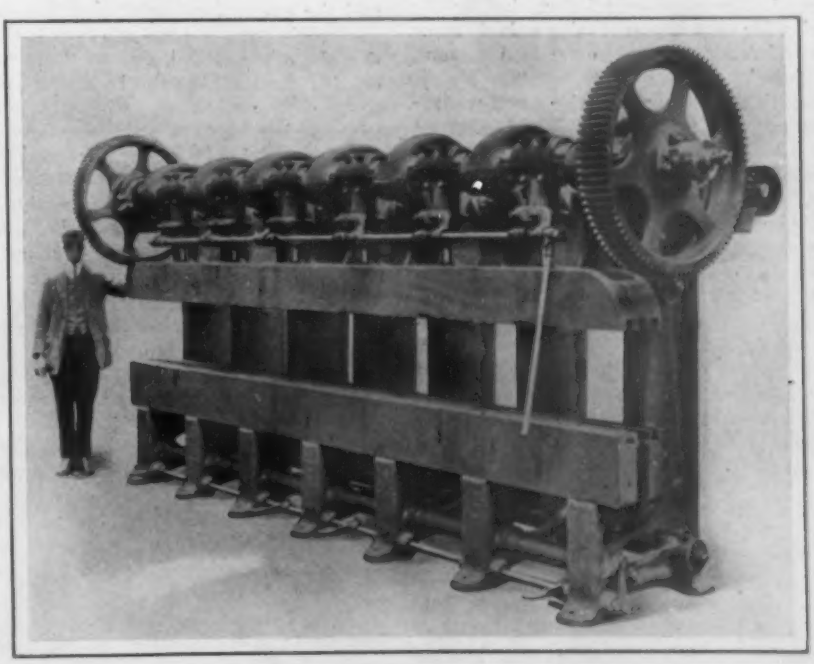
The oil dashpot permits the adjusting of the overload coils, so that a time interval will be required for their operation, as otherwise a momentary fluctuation of the load, which would not interfere with the motor, would trip the switch. The cup-shaped dashpot piston contains two disks with a small hole through them, and by adjusting these so as to partially cover up the holes, the size of the passage through the disks may be varied, and also the time required to force the oil to flow out of the upper dashpot as the core pulls the disks up from instantaneous action to that requiring an interval of 5 min. The overload relays used have five calibration points, ranging from the normal current of the motor to 300 per cent. of the full load current.

The Carnegie Steel Company is building a swimming pool for its workmen at Farrell, Pa.

Six-Crank Bending and Punching Press

The Ferracute Machine Company, Bridgeton, N. J., has recently built several presses in which the frame is composed of seven columns or housings all exactly alike. The crank shaft and the ram are connected by six pitmans, each of which has its own pitman strap and ram adjustment, thus giving practically six presses in one. The advantages claimed for this form of construction are that it is possible to construct the press of any length within reasonable limits by merely adding or subtracting units, the shafts, the bed, the ram and the tie rods being the only parts affected by changes in the length. The fields in which presses of this nature may be employed are the bending or forming of long lengths of structural material, punching long strips or sheets and in connection with sub-presses.

Power is transmitted to the press through clutches located one at either end and operating simultaneously. Torsional effect on the crankshaft is prevented by having a gear with cut teeth at each end. The press is driven by two 30-in. flywheels on the back shaft, each wheel weighing 475 lb. The shaft is a high-carbon steel forging 5 in. in diameter at the cranks and 1 in. less at the journals. Treadles can be arranged where needed on the treadle shaft, four being shown in the accompanying engraving. In this way the operator can start the press at any point of its length. The horizontal worm shaft which is actuated by the ratchet lever shown adjusts all of the pitmans simultaneously by acting on the wormwheels on the pitman stems. The stroke of the press is 2 in. but this can be increased if desired and the adjustment of the ram is 3 in. The slots in both the bed and the ram are planed true to give accurate alignment to the dies which may be clamped at any point. There are holes in the bed between each pair of columns to allow the punchings to drop through and the ram is gibbed to each column, the bearings being long and wide. The total weight of the machine illustrated is approximately 29,300 lb.



A Six-Crank Press for Bending or Forming Structural Material or Punching Long Strips or Sheets

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H. H. Light, the new owner of the property of the Schuylkill Haven Iron & Steel Company, Schuylkill Haven, Pa., states that one or two mills will be added to the present equipment of the plant. He will give his personal attention to the operation of the works.

The Parker White Metal & Machinery Company, Erie, Pa., has moved into its new plant at Twenty-third and Railroad streets, which has three times the capacity of the old plant. Its product is white metal die-castings.

The Canton Stamping & Enameling Company, Canton, Ohio, will call a meeting of its stockholders to consider an increase in the capitalization from $500,000 to $1,000,000.

Science Applied to Industrial Management*

The Taylor System Presented to German Engineers by a Warm Advocate —Contrasts with the Military System

BY JAMES MAPES DODGE†

My experience in scientific management dates from before the time when Frederick W. Taylor published his epoch-making paper on "The Art of Management" some ten years ago. Having enjoyed the intimate friendship of this gentleman, and being in close touch with his work, I watched with great interest the introduction of the Taylor system in our Philadelphia plant, which was done at the same time that the system was introduced in the works of the Tabor Mfg. Company, Philadelphia. These two plants were the first ones to adopt the Taylor system in its entirety, and in both it was successfully introduced and has now been working for a number of years.

Congressional Committee Testimony

I quote from the sworn testimony before a special committee of the House of Representatives of the United States, investigating the Taylor and other systems of shop management in 1912. Two members of the special committee of three are now members of the Cabinet of the President of the United States:

"I had full opportunity to see," in speaking of a manufacturing plant operating under the Taylor system, one of the witnesses before that committee testified, "all of the books and figures, and nothing was more impressive to me than the fact that this company, with approximately the same number of men and machines as was used under the old system, was turning out three times the production; that it was giving 73 per cent. higher wages to workmen; that it had made a 25 per cent. reduction in the selling price of the machines; thereby producing so much saving to the consumer. Moreover, this company, which had lost money before the introduction of scientific management, was now and had been making a good profit; that from a condition of strife and inharmonious relations before the introduction of scientific management there had come about the friendliest of feelings between the management, workmen and outsiders."

I might add that this statement at the present date would apply in substance to a number of establishments in the United States. I had the pleasure of going over this paper with Mr. Taylor, and would state that it met with his hearty approval.

Scientific management, in its presentation to the world, of necessity was exploited as a codification of the best known details having to do with the industrial worker in the shop primarily, and his correlated workers in the office secondarily, and accomplishing what has been admirably designated as "the transference of skill." As time moved on these two groups of individuals have received the greater share of attention separately, and of necessity, in order to establish a working basis, this course was the only one open to Frederick W. Taylor and his followers.

Owner's and Worker's Percentage Unchanged

During this period of about ten years a most important phase of the subject, while well known and prophetically recognized by Mr. Taylor, has not been prominently exploited in the literature of the movement. No more fitting opportunity than the present one could possibly be afforded to present this view of the subject, which is that scientific management in its highest development has to do with the plant or industry in its entirety, increasing the earning power without disturbing the percentage of the gross profit which goes to the wage earner as compensation and to the proprietor as net profit, and increasing the monetary return to each without any change in these percentages, or without either party benefiting to the detriment of the other.

No business has a fixed percentage or amount of profit connected with it. The net gain of any establishment fluctuates from many causes. Of course, every line of business is affected by general trade conditions. Thus, national depression causes individual curtailment of profit, whereas national prosperity augments individual gains; but quite independent of either of these general or national conditions, scientific management manifests itself by increasing the profits of a business at *all times*—in good times by increasing them beyond what we may call the normal or average, and in bad times preventing the curtailment of profit by as much as might otherwise be the case.

How Profits and Wages Are Increased

If an establishment is conducted both in its manufacturing and executive departments in an unscientific manner, it is obvious that its net profits are not so great as they would be if the management were under the highest type of scientific direction and control. In other words, there is an augmentation of profit through proper management of the establishment as a whole, and it goes without saying that this condition calls for co-operation in the highest degree between all those connected with the plant. This co-operation will result in increasing the profits, and therefore the concern will have to its credit more money than it otherwise would, and it is from the division of this extra profit that the owners and operatives can rightfully obtain reward for their joint effort and general betterment.

To illustrate, I might say that a certain concern is making a net profit of $100,000 a year. The wage earners feel that they should have an increase in wages. The management is well satisfied, considering the investment and the effort they make, that $100,000 net profit is none too much, and if anything is too little. Each side feels that the other should give way, the wage earners that part of this $100,000 should be handed over to them in the shape of wage increase, while the proprietor believes that the working men are already receiving too much and that their wages should be curtailed and the profit to the management increased above the $100,000 mark.

It is beyond the scope of human knowledge to decide whether the balance between the employer and employee is exactly right or not. All that we can judge by is the average. If we could tell what the average earnings are in a given line of industry, and what the average profits are, we might assume that these figures, having been arrived at through a long period of time and experience, are nearly if not, in fact, exactly right. How is it possible for either side to secure greater compensation without working hardship to the other? It would seem that there is only one possible solution, and that is to increase the net gain by increasing the output, thus enabling the employers to increase their earnings and also the wages of their employees. It is obvious that if this is done the percentages, representing wages on the one hand, and net earnings on the other, need not be radically changed for either side in order that there may be an increased return to both, because the amount to be apportioned has been increased. This is what scientific management can accomplish and is accomplishing today.

The very foundation of scientific management is increasing prosperity by intelligent co-operation. It is known to all that industrial unrest comes from the lack of agreement as to what shall be the division of the earnings of an establishment.

Bad management and exploitation of an industry hold down the profit, and if at the same time the workers feel that they are doing their best and should receive more wages, we have a condition leading to mutual mistrust and consequently industrial disagreement, the result of which we all know only too well. If, on the other hand,

*An address at the joint meeting of the American Society of Mechanical Engineers and the Verein Deutscher Ingenieure, Leipzig, Germany, June 23, 1913.

†Chairman of board, Link-Belt Company, Philadelphia.

the management of an establishment is all that can be desired in the matter of its accounting, selling and advertising, and other departments, and the shop is behind, either because of obsolete machinery or inefficient, untrained and dissatisfied operatives, the same results may be looked for—that is, discontent, mutual distrust and strife. If, however, the fact is recognized that neither employer nor employee is alone to be benefited by the introduction of scientific management, but that it is essentially and necessarily a matter of mutual good, enlightenment and co-operation, it puts a new phase on the matter.

A Mental Revolution in Employees and Managers

In its essence, scientific management involves a complete mental revolution on the part of the working man engaged in any particular establishment or industry—a complete mental revolution on the part of these men as to their duties toward their work, toward their fellowmen and toward their employers. And it involves an equally complete mental revolution on the part of those on the management's side—the foreman, the superintendent, the owner of the business, the board of directors—a complete mental revolution on their part as to their duties toward their fellow workers in the management, toward their workmen and toward all of their daily problems. And without this complete mental revolution on both sides scientific management cannot exist.

If the employer feels that scientific management is merely a method by which he makes his workmen exert themselves very much harder and entirely to his own gain he had better abandon all consideration of the subject and stick to his present methods, or else go out of business. If, on the other hand, the workingman feels that scientific management is simply an ingenious scheme to exhaust him physically and permit all his other conditions to remain as they are he too is in an unfortunate intellectual state. It is necessary for both of these interested groups to realize that they must change their view and earnestly desire to assist each other.

Obviously, if the workingman desires more wages under existing conditions, whatever he obtains in excess of his present compensation must be deducted directly from the profits of the concern; and if the proprietor feels that he must for his own comfort increase his profits, and his vision reveals to him only the total of his payroll, from which he proposes to extract enough to make him happy, then both are grievously at fault and are working hopelessly in the wrong direction.

If, however, the employer will recognize that each of the names on his payroll represents a human manufacturing unit, entitled to a fair and living return on its physical and mental investment, and in addition thereto a reasonable profit to cover other things besides food, clothing and shelter, a proper frame of mind will be established mutually to give that which is most desired, the highest reasonable and proper recompense for effort and investment.

If this mental attitude can be made permanent in both the employer and employee, and each recognizes the necessity of increasing the output in order to increase the net gains, then scientific management comes to its own and the greatest good that is possible for it to bestow can be given to all, and the artificial barrier between the employer and employees removed for all time.

Things Both Sides Must Learn

The practical method of obtaining this most desirable end is for scientific management to act as a medium between the class of employers and the class of employees and to train and educate them at the same time. The first lesson is that mutual confidence can take the place of mutual distrust, and this effort carries with it the first change of mental attitude. The employer must understand that the fact of his outranking the employee does not necessarily mean that he possesses all of the necessary knowledge and experience needed in directing him properly. In other words, he must not think that because he is in a commanding position there is nothing for him to learn. On the other hand, the employee must change his mental attitude and realize that the title of the working men, machinist, patternmaker, or whatever it may be, does not give him a universal knowledge of his trade, but that the employer may have useful knowledge to impart to him. In turn the employer may acquire useful and desirable information from the workingman. Scientific management is the clearing house standing between them, the principal work of which is to make this demonstration so clear that both sides will appreciate it and understand it. After this is accomplished nothing is left but the arranging of the mechanical and clerical details, which can be readily and satisfactorily done.

The next result is that the employer and employee mutually understand and aid each other, and scientific management, although present and ever pervading, ceases to be apparent because it has been absorbed by both sides and continues to do its beneficial work without exciting comment. This condition actually does prevail in all the shops and establishments in which scientific management in its entirety has been introduced and has become an organic part of the establishment. In other words, were a stranger to visit a shop in which scientific management has been in full operation for a few years and ask anyone in the establishment, with the possible exception of a few having the upkeep of the system directly in charge, what system, if any, they were working under, he might be surprised to find that none of the clerical or productive force knew that there was any special system in vogue, since they had become so accustomed to the conditions, and so well satisfied with them that the name of the system under which they were working would be of no importance, and, if ever known, had been forgotten.

The Military System in Industry

It is well to bear in mind that this question of mental attitude is a matter of much more importance than is commonly supposed, since scientific management stands in direct contrast with the older or what has been aptly called the military system of management. Writers on this general subject have pointed out very properly that the military idea does not represent the best form of industrial or civil management. Its idea is based on military methods, in which under the best conditions a man is carefully trained from the position of private, step by step, until he attains the highest rank, having mastered the details of each step in the ladder of advancement. The science of war is a very highly developed one, so that a mentally diligent officer can add to his personally acquired knowledge by means of literature on the subject, and consequently be eminently fitted to command and lead.

Such an educational possibility, except in very rare instances, does not exist in industrial and commercial development. While a few of those in commanding positions in industrial life have risen from the ranks, a large percentage attack the problem from the top, and consequently have but a theoretical knowledge of the conditions surrounding the employee and of his mental attitude. Placed in a position of command, they are apt to assume that the position carries with it all necessary knowledge, and therefore that blind obedience is to be demanded and accorded. The workingman feels that he is in possession of knowledge which his employer possibly has not, and that the employer makes mistakes, not only in the instruction which he may impart, but also in failing to surround the workmen with proper facilities wherewith to meet the demands of his work. In this case the employee loses respect for the man ostensibly over him and is stung with the injustice of the situation. In the absence of the harmonizing influence of scientific management, the two parties never understand each other sufficiently to realize that their interests are identical, and not opposed to each other.

Reciprocal Responsibilities

What then should be the attitude of both sides? The employer should pay as high wages as is properly possible and should make the employee physically comfortable, giving him sanitary surroundings, which are the first requisite to physical and therefore mental comfort. He should next provide him with every proper facility for performing his work, as the soldier is provided with proper clothing, equipment and firearms, and without which it would be ridiculous and unjust and, if avoidable, really criminal for the commanding officer to make demands upon him. For instance, in a shop, bad water and light, insufficient ventilation, lack of proper heat, bad tools, etc., all conspire to render it impossible for the workman to do himself or his employer justice. Nevertheless, in many

cases everything is demanded and facilities are woefully lacking, making it therefore impossible for the employee to respond satisfactorily.

Now, if scientifically attempted, and with the proper sympathetic regard, it soon becomes apparent to the workingman that the information that is given him, with a view to aiding him in the performance of his work, is correct and in advance possibly of what he has known before. This is an important step in inspiring confidence. Then if the tools are properly selected and supplied him, his environment made comfortable and his whole endeavor surrounded by rational aid, this feeling of confidence and regard for his employer becomes a fixture in his mind and being. If, while this is going on, honest effort is made by the employee to perform his work, the employer is impressed with respect for the workman, and this respect and a growing confidence in him give the employer and the employee a better understanding and high appreciation of their mutual values in the success of the establishment.

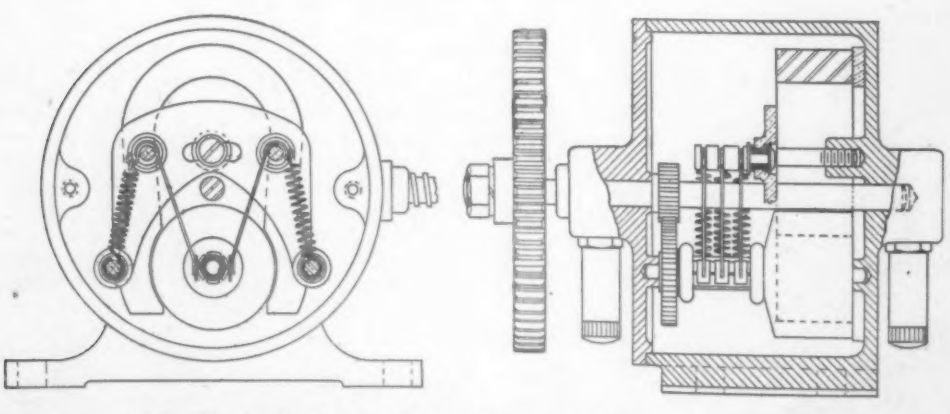
After these conditions are brought about, all else is easy, and simply calls for an expenditure of time, patience and a desire to assist. The details of scientific management so far as methods of timekeeping, pay, timestudy and all that goes with it have been ably presented, and I do not deem this the proper time to say any more in regard to those details of the problem. It is sufficient to say that no one of these details is absolutely essential. All may be modified, provided that in making the modifications positive conflict with other details is not developed. All must be done with a broad understanding and with the spirit of absolute faith in the outcome and confidence in the triumph of truth over error.

An Electric Machine Tachometer

A new tachometer, for measuring the speed of machine tools and shafting, has been brought out by the Electric Tachometer Company, Broad and Spring Garden streets, Philadelphia, Pa. Although designed originally for use in connection with the speed of internal combustion engines in motor boats and aeroplanes, the device has now been developed for machine shop and factory use. It consists of a small direct-current magneto generator and an indicating voltmeter, the two parts being connected by a twin insulated cable. The principle of operation is the well-known one that when a system of coils is rotated within a permanent magnetic field, an electric voltage is generated in direct proportion to the speed of rotation of the moving coils. The principal points of construction about the magneto are the making of the pole pieces integral with the magnet, the use of an internal gear drive, a small air gap and the use of a long commutator with the brushes connected in parallel.

The magneto is of the direct-current type and consists of a six-pole armature rotating between the poles of a permanent horseshoe magnet. The current is generated in the armature by its rotation and is led to the line through a six-part commutator. The armature is driven through gearing from the main external shaft by spur gears, an arrangement which brings the bearings of the armature and commutator entirely within a water-tight and dust-proof case, where grit cannot interfere with their operation. This construction, it is emphasized, also permits a very small air gap around the armature between the magnet limbs to be used, which insures permanence of the magnetic field. One of the advantages claimed for the internal gear drive is that any wear on the main bearing will not cause the armature to collide with the pole pieces, nor will any end play of the main driving shaft produce any trouble with the brushes on the commutator, which is long, and has the brushes arranged on it in parallel.

The indicator used is of the permanent field type of electrical instrument, in which a permanent horseshoe magnet is employed. Between the poles of this magnet a light moving coil swings in an arc of 90 deg., its movement being directly proportional to the electric pressure supplied to it by the twin wire lead from the generator. If desired, a number of these indicators can be connected to the same magneto to give simultaneous indications at various places in the plant, and graphic recording instruments and capacity indicators with the scale reading in output per hour can also be supplied.



Diagrammatic View Showing the Construction of a New Electric Tachometer for Measuring the Speed of Machine Tools and Shafting

A New Type of Multiple Disk Brake

Accessibility of parts and the securing of ventilation are the two special features claimed by the Cutler-Hammer Clutch Company, Milwaukee, Wis., for a new type of multiple disk brake, which it has placed on the market. These brakes are intended for different classes of service, such as for crane hoists or the screw-down of a rolling mill, etc., and are rated in horsepower, maximum torque in foot-pounds and the capacity in foot-pounds per minute. Fig. 1

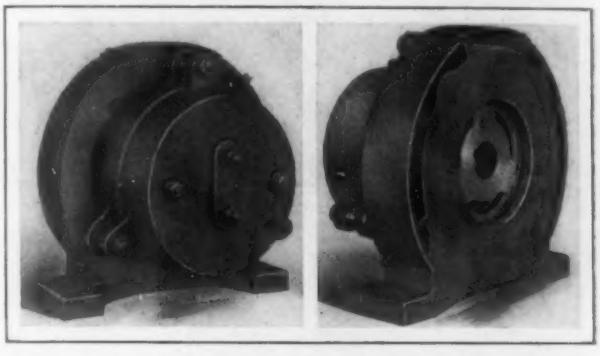


Fig. 1—Two Views of a New Magnetic Multiple Disk Brake Showing the Air Inlet Passages in the Hub and the Outlet Passages Around the Outside Edge of the Inclosing Case

gives two views of the brake, the one at the right showing the air inlet passages in the hub and the outlet passages around the outside edge of the inclosing case. The construction of the brake is illustrated in Fig. 2, which is a view with the various parts taken out of the case.

These brakes consist of a magnet case, a hub, a series of stationary and rotating disks, an inclosing case for the disks and a spiral spring; the case, the hub and the two sets of disks being shown in that order from left to right in Fig. 2. The hub, which is mounted on the shaft, carries the rotating disks that are interleaved between the stationary ones, which are anchored to the inclosing case. The stationary disks are faced with a patented product and there are internal radial air passages in the rotating disks.

Under normal conditions the two sets of disks are brought into frictional engagement by the spiral compression spring. This spring is compressed by the electromagnet, and the pressure on the disks is thus released when it is desired to release the brake. In this way it is pointed out that the intensity of the braking force can

readily be adjusted and the brakes are applied and released without shock or hammer. As the actuating forces are balanced within the brake there is no end thrust imposed on the shaft to which they are attached.

The friction facing on the stationary disks is made of a patented product consisting of a weave of asbestos and brass wire, which is riveted to the disk by countersunk copper rivets. Before deciding upon the character of the facing, an extensive series of tests was made, and it was found that this material possessed superior wearing and braking qualities. As a precaution against grounds or short circuits, all the brake coils are impregnated in the same way as the magnet coil of the company's lifting magnet.

If it is desired to remove the disks at any time, it is simply necessary to loosen the three bolts holding the magnet coil in place. Access to the disks is obtained in this way, and they can be slid out of the case along the shaft. This, it is emphasized, is a distinct advantage as compared with some of the other types of brakes and no other work is required. The rotating disks shown in Fig. 2 have cored radial passages similar to those in the runner of a centrifugal pump. When the disks are set in motion, air is drawn in through the inlet passages in the hub, and ejected from outlets in the side of the disk-inclosing frame, under the

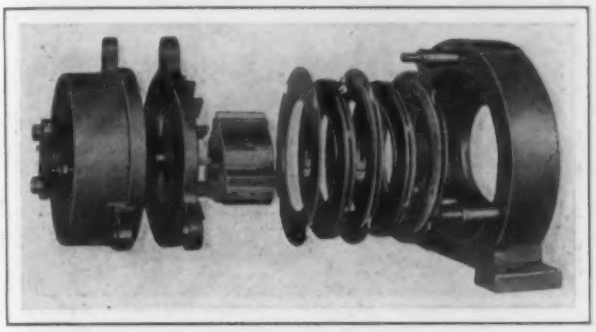


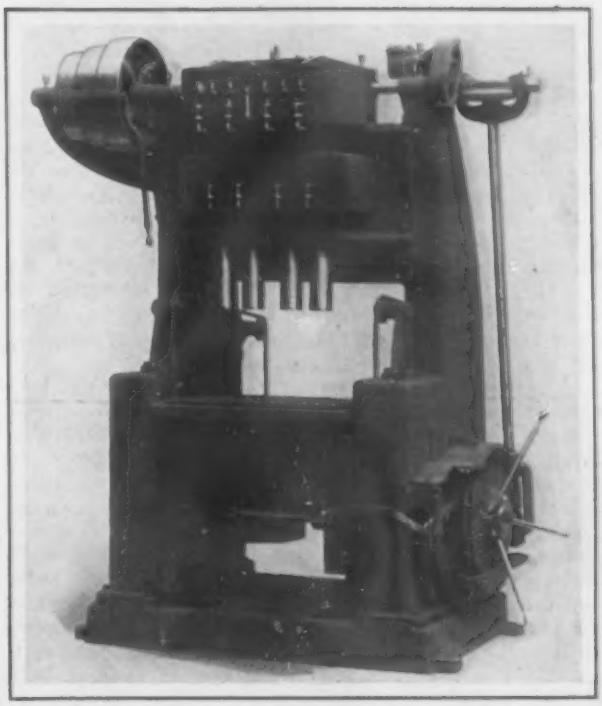
Fig. 2—A View of the Brake with the Various Parts Taken Out of the Case

cover, the arrangement of these passages being shown at the right of Fig. 1. In this way, it is pointed out that ample ventilation is secured which gives a greater capacity and better wearing qualities. No lubrication is required and only a minimum amount of attention is necessary.

Vertical Machine for Boring Cylinders

For boring and reaming cylinders which are cast either singly, in pairs or en bloc, the Foote-Burt Company, Cleveland, Ohio, has brought out a line of vertical machines. Each of these machines is built especially for the particular type of cylinder it is to bore, the advantages claimed for this method being that it is possible to keep everything close together and provide sufficient overhang to the spindles, feed to the table, width between housings, etc., to accomplish the work which is to be done. The four-spindle fixed center machine is the one shown in the accompanying engraving.

In the design of this machine, care was taken to eliminate any tendency to chatter, and to insure a steady, even drive and feed under all conditions. This has been accomplished by the use of worm and worm gear drive with the final drive through double pitch nickel steel spur gears. The spindles are made from special high-carbon forgings adjusted for wear by taper bearings with fully inclosed thrust collars. The driving mechanism is entirely inclosed and runs in oil, an arrangement which, it is pointed out, eliminates undue wear caused by iron dust getting into these parts. The feed mechanism consists of a worm and worm gear with the final drive through spur gears. The pitch line of the feed pinions and racks is located directly under the center of the spindles and an accurate knock-out for the power feed is provided. Counterweights are attached to the table directly in line with the spindles and the table slides are proportioned so that the table does not feed out of the ways, even at the highest point of its travel. The spindles can be stopped quickly at the end of a cut by a brake and the cylinders are prevented from being scored when the table is returned. It emphasized that the entire operating mechanism is simple and compact



A Vertical Machine for Boring and Reaming Automobile Engine Cylinders Whether Cast Singly, in Pairs or En Bloc

and was arranged to insure the maximum output without excessive effort on the part of the operator.

The method recommended by the builder for holding the cylinders is one that has been developed from long experience in the construction of machines of this type. It consists of a box jig, having removable jig plates, the function of the latter being to guide and support the spindles through hardened and ground bushings in the jig plates. After the boring tool has left the jig plates, the spindles are supported by bronze bushings that fit on the spindles and are slipped in place in the jig plate bushings and support the spindles while they are boring. It is emphasized that in this way by bolting the jig to the table and guiding the spindles the entire machine is tied together and the chance for deflection under the cut is eliminated.

As has been mentioned, these machines can be used on cylinders cast in various ways, the centers being specially arranged to suit the requirements of each individual case. Two, three, four or six spindles are built in the fixed-center type and two, three and four spindle sizes in the adjustable-center type.

New England Iron and Hardware Association.—The annual meeting of the New England Iron and Hardware Association was held at Young's Hotel, Boston, June 18, preceded by dinner. The retiring president, Frederick L. Greeley, who held the office two years, reviewed the work of his administration. The following were elected directors: Frederick L. Greeley, Leon C. Carter, Frank A. Marvin, Charles F. Bragg, W. B. Ayer, Charles A. Adams, C. W. Henderson, R. M. Boutwell, George M. Gray, W. B. Willcut and A. B. Marble. The directors unanimously elected George M. Gray, Peter Gray & Sons, Cambridge, Mass., president, and Charles A. Adams, of J. B. Varrick, Manchester, N. H., vice-president. George J. Mulhall was re-elected clerk. The bureau of credit under his management is handling more claims than ever in its history.

At a meeting of the stockholders of the Whitaker-Glessner Iron Company, at Wheeling, W. Va., to be held July 8, a resolution will be submitted providing for increasing the company's capital stock from $5,000,000 to $7,000,000. It is proposed to divide the stock into common and preferred as follows: A total authorized common capital stock of $5,000,000, consisting of 50,000 shares of the par value of $100 each, and a total authorized preferred capital stock of $2,000,000, consisting of 20,000 shares of the par value of $100 each.

Grinding Machine Equipped with a Crane

For grinding castings and handling such pieces which are usually too heavy and large to be finished in the ordinary way, the Mummert-Dixon Company, Hanover, Pa., has designed and built a new type of grinding machine. This is virtually a grinding stand, combined with a power jib crane, but provision is also made for operating the hoist by hand through a crank handle, which slips on the end of the clutch shaft. With this arrangement, when castings which are too heavy to be lifted by hand are being ground, the crane is employed to support them at the proper hight and distance from the grinding wheel. In this way, it is only necessary for the operator to swing them against and along the wheel, and it is not necessary for him to do any hard labor of hand lifting.

The hoist is operated by power and the raising and lowering is controlled by a lever located in a convenient position for the operator. It is possible to swing the casting in any position horizontally and suspend it at any hight, thus making it possible to get at all surfaces of the casting in a short time. The hoist trolley which is mounted on the jib is driven by a square shaft that derives its power through bevel gears from clutch pulleys mounted on a shaft, supported by a bracket attached to the frame. These two clutch pulleys, one of which is used for hoisting and the other lowering, are driven by belts from the countershaft at the back of the machine, both clutches being controlled by a single lever. In the central position, both clutches are out of engagement and moving the lever in one direction engages the lifting clutch, while motion in the other one, brings the lowering clutch into play. The trolley moves in or out on the jib, as the workman moves the casting, and the swinging jib also follows if the movement is not in the same vertical plane with it.

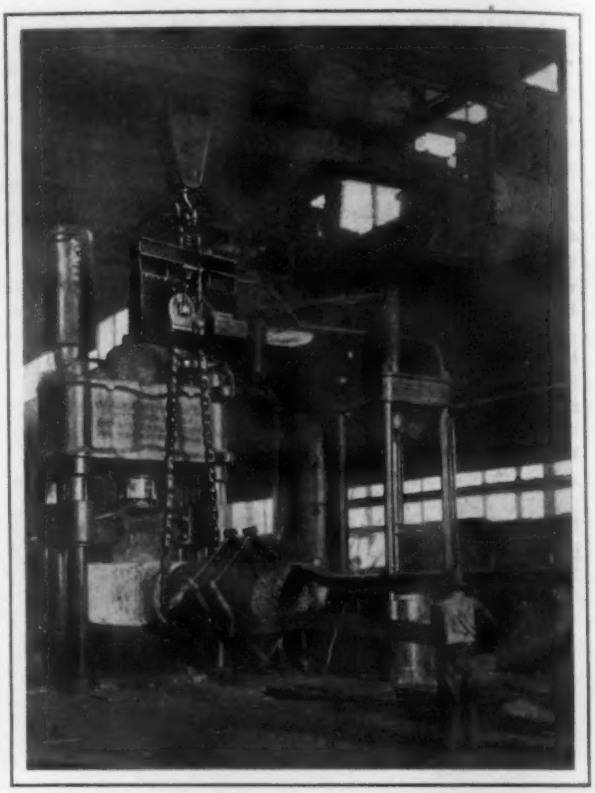
The emery wheel stand is mounted at the front of the heavy base and has an overhang to give clearance in front of and under the wheels. The steel arbor runs in long self-oiling bearings, and the wheels are protected by steel guards. For handling lighter castings a detachable rest is provided. The countershaft, from which the power for operating the wheels is derived, is placed at the back of the machine, a feature which keeps the belt out of the way. Two steel frames constructed of channels are placed on the rear portion of the base and the brackets supporting the swing arm of the jib crane are fastened to these frames.

A Grinding Machine Having a 1-Ton Hoist for Handling Heavy Castings to and from the Wheels

No. 1 Haselton furnace of the Republic Iron & Steel Company, at Haselton, Ohio, has been blown in after being relined and repaired.

Handling Heavy Ingots with a Rotating Block

At the plant of the Titusville Forge Company, Titusville, Pa., a Brownhoist electric rotating block is being employed for rotating and handling heavy ingots and forgings at the large presses. The block, which was designed and manufactured by the Brown Hoisting Machinery Company, Cleveland, Ohio, is mounted on a traveling crane and is operated from the cage by the regular operator. Its use facilitates the handling and turning of large ingots weighing several tons and saves both time and labor. In the accompanying engraving a 55,000-lb. ingot is shown being handled by the block at a large hydraulic press of 1000-tons capacity.



A Brownhoist Electric Rotating Block in Use for Rotating and Handling Heavy Ingots at a Large Forging Press

The rotating block is of steel plate construction and consists of a 7½-hp. motor connected through reduction gearing to a sprocket wheel and chain. An asbestos covered steel sheet with an intervening air space between it and the motor serves to protect the latter from the intense heat radiated by the ingot below. The block consists of two sections ,the lower one containing the motor, the gearing and the heavy steel chain which carries and rotates the load. The entire block is suspended on a 3-in. eye bolt on roller bearings, so that it can be turned at any angle easily, and the lower section is connected to the upper one by four double compression springs, located two at each end. The jar is taken up by these springs which relieve the strain on the crane hook. Several collector rings located on the suspending eye bolt feed the current to the rotating motor. If desired, this block can be used on any design and type of crane.

The citizens of Oil City, Pa., conducted a vigorous campaign recently for the increase of membership in the local Chamber of Commerce and the raising of a fund for the purpose of enabling that body to do more efficient work in promoting the welfare of the city. In five days the membership was swelled to 2223 and the subscriptions totaled $60,565.

The Superior Plating Works, 619 LaSalle avenue, Chicago, has been incorporated with a capital stock of $40,000 by F. J. Setchett, W. K. Greene and E. L. Kreamer, who have been conducting a business in general plating at that address.

Underwood-Simmons Metal Tariff Schedule

Tariff Duties on Metals as Reported to Senate Democratic Caucus Show Many Changes from House Bill

Below will be found the text of the metal tariff schedule as decided upon by the Democratic or majority members of the Finance Committee of the United States Senate, and as presented to the Senate Democratic caucus Friday, June 20. There will also be found such paragraphs from that committee's free list as relate to metals. In its present shape the Underwood-Simmons bill, as it will henceforth be called, differs materially from the Underwood bill as it passed the House of Representatives. In reconstructing the bill the Senate Finance Committee made numerous important reductions in duty and a few advances.

The free list has been enlarged by the transfer to it of pig iron, spiegeleisen, scrap iron, scrap steel, ferromanganese; iron in slabs, blooms, loops or other forms less finished than iron bars and more advanced than pig iron except castings; steel ingots and cogged ingots, blooms and slabs, die blocks or blanks, and steel billets not containing alloys such as nickel, vanadium, chromium, etc. The duty on bar iron has been reduced from 8 to 5 per cent.; structural shapes, from 12 to 10 per cent.; plates, from 15 to 12 per cent.; forgings, from 15 to 12 per cent.; hoops and bands, from 12 to 10 per cent.; sheets and tin plates, from 20 to 15 per cent.; steel bars, from 10 to 6 per cent.; steel wool, from 20 to 15 per cent.; certain classes of wire, from 20 to 15 per cent.; wire rope, from 30 to 25 per cent.; bolts, from 15 to 10 per cent.; nuts, from 15 to 5 per cent.

The very few increases in duty include cast-iron pipe, which has been advanced from 12 to 15 per cent.; lead ore, from ½ to ¾ of 1 cent per lb. on the lead contained therein; zinc ore, from 10 to 12½ per cent.; zinc in blocks, pigs or sheets and scrap zinc from 10 to 15 per cent.

For the purpose of making some comparisons with the rates in the Underwood bill as passed by the House of Representatives, the Underwood rates are given in parentheses. Other changes from the Underwood bill have not been indicated, as this would cause a complicated method of presenting the amended bill which would be confusing to the reader. We have, however, a limited supply of copies of the Underwood metal schedule, printed as a supplement to *The Iron Age*, April 10, 1913, which we will be pleased to furnish on application to those who desire to study more thoroughly the changes made by the Senate Finance Committee.

SCHEDULE C—Metals and Manufactures of

104. Chrome or chromium metal, ferrochrome or ferrochromium, ferromolybdenum, ferrophosphorus, ferrotitanium, ferrotungsten, ferrovanadium, molybdenum, titanium, tantalum, tungsten or wolfram metal, and ferrosilicon, and other alloys used in the manufacture of steel, not otherwise specially provided for, 15 per cent. ad valorem.

105. Muck bars, bar iron, square iron, rolled or hammered, round iron, in coils or rods, bars or shapes of rolled or hammered iron not specially provided for in this section, (8) 5 per cent. ad valorem.

106. Beams, girders, joists, angles, channels, car-truck channels, TT, columns and posts or parts or sections of columns and posts, deck and bulb beams, sashes, frames, and building forms, together with all other structural shapes of iron or steel, whether plain, punched, or fitted for use, or whether assembled or manufactured, (12) 10 per cent. ad valorem.

107. Boiler or other plate iron or steel, and strips of iron or steel, not specially provided for in this section; sheets of iron or steel, common or black, of whatever dimensions, whether plain, corrugated or crimped, including crucible plate steel and saw plates, cut or sheared to shape or otherwise, or unsheared, and skelp iron or steel, whether sheared or rolled in grooves, or otherwise, (15) 12 per cent. ad valorem.

108. Iron or steel anchors or parts thereof; forgings of iron or steel, or of combined iron and steel, but not machined, tooled, or otherwise advanced in condition by any process or operation subsequent to the forging process, not specially provided for in this section, (15) 12 per cent. ad valorem; antifriction balls, ball bearings, and roller bearings, of iron or steel or other metal, finished or unfinished, and parts thereof, 35 per cent. ad valorem.

109. Hoop, band, or scroll iron or steel not otherwise provided for in this section, (12) 10 per cent. ad valorem.

110. Railway fishplates or splice bars made of iron or steel, 10 per cent. ad valorem.

111. All iron or steel sheets, plates, or strips, and all hoop, band, or scroll iron or steel, when galvanized or coated with zinc, spelter, or other metals, or any alloy of those metals; sheets or plates composed of iron, steel, copper, nickel, or other metal with layers of other metal or metals imposed thereon by forging, hammering, rolling, or welding; sheets of iron or steel, polished, planished, or glanced, by whatever name designated, including such as have been pickled or cleaned by acid, or by any other material or process, or which are cold rolled, smoothed only, not polished, and such as are cold hammered, blued, brightened, tempered, or polished by any process to such perfected surface finish or polish better than the grade of cold rolled, smoothed only; and sheets or plates of iron or steel, or taggers iron or steel, coated with tin or lead, or with a mixture of which these metals, or either of them is a component part, by the dipping or any other process, and commercially known as tin plates, terne plates, and taggers tin; and tin plates coated with metal, and metal sheets decorated in colors or coated with nickel or other metals by dipping, printing, stenciling, or other process, (20) 15 per cent. ad valorem.

112. Steel bars, and tapered or beveled bars; mill shafting; pressed, sheared, or stamped shapes, not advanced in value or condition by any process or operation subsequent to the process of stamping; hammer molds or swaged steel; gun-barrel molds not in bars; all descriptions and shapes of dry sand, loam, or iron molded steel castings, sheets, and plates, (10) 6 per cent. ad valorem; steel ingots, cogged ingots, blooms and slabs, die blocks or blanks; billets and bars and tapered or beveled bars; pressed, sheared, or stamped shapes not advanced in value or condition by any process or operation subsequent to the process of stamping; hammer molds or swaged steel; gun-barrel molds not in bars; alloys used as substitutes for steel in the manufacture of tools; all descriptions and shapes of dry sand, loam, or iron molded castings, sheets, and plates; rolled wire rods in coils or bars not smaller than twenty one-hundredths of one inch in diameter, and steel not specially provided for in this section, all the foregoing when made by the crucible, electric, or cementation process, either with or without alloys, and finished by rolling, hammering, or otherwise, and all steels by whatever process made, containing alloys such as nickel, cobalt, vanadium, chromium, tungsten, wolfram, molybdenum, titanium, iridium, uranium, tantalum, boron, and similar alloys, (15) 10 per cent. ad valorem.

113. Steel wool or steel shavings, (20) 15 per cent. ad valorem.

114. Grit, shot, and sand, by whatever name known, made of iron or steel, that can be used as abrasives, (30) 25 per cent. ad valorem.

115. Rivet, screw, fence, nail, and other iron or steel wire rods, whether round, oval, or square, or in any other shape, and flat rods up to 6 inches in width ready to be drawn or rolled into wire or strips, all the foregoing in coils or otherwise, including wire rods and iron or steel bars, cold rolled, cold drawn, cold hammered, or polished in any way in addition to the ordinary process of hot rolling or hammering, 10 per cent. ad valorem: Provided, that all round iron or steel rods smaller than twenty one-hundredths of one inch in diameter shall be classed as wire.

116. Round iron or steel wire; wire composed of iron, steel, or other metal, except gold or silver, covered with cotton, silk, or other material; corset clasps, corset steels; dress steels, and all flat wires and steel in strips not thicker than seven one-hundredths of one inch and not exceeding 5 in. in width, whether in long or short lengths,

in coils or otherwise, and whether rolled or drawn through dies or rolls, or otherwise produced; telegraph, telephone, and other wires and cables composed of metal and rubber, or of metal, rubber, and other materials; iron and steel wire coated by dipping, galvanizing, or similar process with zinc, tin, or other metal; all other wire not specially provided for in this section and articles manufactured wholly or in chief value of any wire or wires provided for in this section; all the foregoing (20) 15 per cent. ad valorem; wire heddles and healds, and wire rope, (30) 25 per cent. ad valorem; copper, brass, and bronze woven wire cloth, 30 per cent. ad valorem.

117. No article not specially provided for in this section, which is wholly or partly manufactured from tin plate, terne plate, or the sheet, plate, hoop, band, or scroll iron or steel herein provided for, or of which such tin plate, terne plate, sheet, plate, hoop, band, or scroll iron or steel shall be the material of chief value, shall pay a lower rate of duty than that imposed on the tin plate, terne plate, or sheet, plate, hoop, band, or scroll iron or steel from which it is made, or of which it shall be the component thereof of chief value.

118. No allowance or reduction of duties for partial loss or damage in consequence of rust or of discoloration shall be made upon any description of iron or steel, or upon any article wholly or partly manufactured of iron or steel, or upon any manufacture of iron or steel.

119. All metal produced from iron or its ores, which is cast and malleable, of whatever description or form, without regard to the percentage of carbon contained therein, whether produced by cementation, or converted, cast, or made from iron or its ores, by the crucible, Bessemer, Clapp-Griffith, pneumatic, Thomas-Gilchrist, basic, Siemens-Martin, or open-hearth process, or by the equivalent of either, or by a combination of two or more of the processes, or their equivalents, or by any fusion or other process which produces from iron or its ores a metal either granular or fibrous in structure, which is cast and malleable, excepting what is known as malleable-iron castings, shall be classed and denominated as steel.

120. Anvils of iron or steel, or of iron and steel combined, by whatever process made, or in whatever stage of manufacture, 15 per cent. ad valorem.

121. Finished automobiles, valued at $1500 or over, and automobile bodies, 45 per cent. ad valorem; finished automobiles valued at less than $1500, 30 per cent. ad valorem; automobile chassis, and finished parts of automobiles, not including tires, 30 per cent. ad valorem.

122. Bicycles, motorcycles, and finished parts thereof, not including tires, (40) 25 per cent. ad valorem.

123. Axles, or parts thereof, axle bars, axle blanks, or forgings for axles, whether of iron or steel, without reference to the stage or state of manufacture, not otherwise provided for in this section, 10 per cent. ad valorem: Provided, that when iron or steel axles are imported fitted in wheels, or parts of wheels, of iron or steel, they shall be dutiable at the same rate as the wheels in which they are fitted.

124. Blacksmiths' hammers, tongs, and sledges, track tools, wedges, and crowbars, whether of iron or steel, 10 per cent. ad valorem.

125. Nuts or nut blanks, and washers, 5 per cent. ad valorem; bolts of iron or steel, with or without threads or nuts, or bolt blanks, finished hinges or hinge blanks, 10 per cent. ad valorem; spiral nut locks and lock washers, whether of iron or steel, (35) 25 per cent. ad valorem.

126. Card clothing not actually and permanently fitted to and attached to carding machines or to parts thereof at the time of importation, when manufactured with round iron or untempered round steel wire, 10 per cent. ad valorem; when manufactured with tempered round steel wire, or with plated wire or other than round iron or steel wire, or with felt face, or wool face, or rubber face cloth containing wool, 30 per cent. ad valorem.

127. Cast-iron pipe of every description, (12) 15 per cent. ad valorem; cast-iron andirons, plates, stove plates, sadirons, tailor's irons, hatter's irons, and castings and vessels wholly of cast iron, including all castings of iron or cast-iron plates which have been chiseled, drilled, machined, or otherwise advanced in condition by processes or operations subsequent to the casting process but not made up into articles or finished machine parts; castings of malleable iron not specially provided for in this section; cast hollow ware, coated, glazed, or tinned, 10 per cent. ad valorem.

128. Chain or chains of all kinds, made of iron or steel, not specially provided for in this section, 20 per cent. ad valorem; sprocket and machine chains, 25 per cent. ad valorem.

129. Lap-welded, butt-welded, seamed, or jointed iron or steel tubes, pipes, flues, or stays, cylindrical or tubular tanks or vessels; for holding gas, liquids, or other material, whether full or empty; flexible metal tubing or hose, not specially provided for in this section, whether covered with wire or other material, or otherwise, including any appliances or attachments affixed thereto; welded cylindrical furnaces, tubes or flues made from plate metal, and corrugated, ribbed, or otherwise reinforced against collapsing pressure, and all other iron or steel tubes, finished, not specially provided for in this section, 20 per cent. ad valorem.

130. Penknives, pocketknives, clasp knives, pruning knives, budding knives, erasers, manicure knives, and all knives by whatever name known, including such as are denominatively mentioned in this section, which have folding or other than fixed blades or attachments, and razors, all the foregoing, whether assembled but not fully finished or finished; valued at not more than $1 per dozen, 35 per cent. ad valorem; valued at more than $1 per dozen, 55 per cent. ad valorem: Provided, that blades, handles, or other parts of any of the foregoing knives, razors, or erasers shall be dutiable at not less than the rate herein imposed upon the knives, razors, and erasers, of which they are parts. Scissors and shears, and blades for the same, finished or unfinished, 30 per cent. ad valorem: Provided further, that all articles specified in this paragraph shall, when imported, have the name of the maker or purchaser and beneath the same the name of the country of origin die-sunk conspicuously and indelibly on the blade, shank, or tang of at least one or, if practicable, each and every blade thereof.

131. Sword blades, and swords and side arms, irrespective of quality or use, in part of metal, 30 per cent. ad valorem.

132. Table, butchers', carving, cooks', hunting, kitchen, bread, butter, vegetable, fruit, cheese, carpenters' bench, curriers', drawing, farriers', fleshing, hay, tanners', plumbers', painters', palette, artists', and shoe knives, forks and steels, finished or unfinished, without handles, 25 per cent. ad valorem; with handles, 30 per cent. ad valorem: Provided, that all the articles specified in this paragraph, when imported, shall have the name of the maker or purchaser, and beneath the same the name of the country of origin indelibly stamped or branded thereon in a place that shall not be covered thereafter.

133. Files, file blanks, rasps, and floats, of all cuts and kinds, machine cut, 25 per cent. ad valorem; hand-cut files and files of precision, 35 per cent. ad valorem.

134. Muskets, air-rifles, muzzle-loading shotguns and rifles, and parts thereof, 15 per cent. ad valorem.

135. Breech-loading shotguns and rifles, combination shotguns and rifles, and parts thereof and fittings therefor, including barrels further advanced than rough bored only; pistols, whether automatic, magazine, or revolving, or parts thereof and fittings therefor, 35 per cent. ad valorem.

136. Table, kitchen, and hospital utensils, or other similar hollow ware composed wholly or in chief value of aluminum or any of the above composed wholly or in chief value of iron or steel, enameled or glazed with vitreous glasses, but not ornamented or decorated with lithographic or other printing, 25 per cent. ad valorem.

137. Needles for knitting or sewing machines, latch needles, crochet needles, and tape needles, knitting and all other needles not specially provided for in this section, bodkins of metal, and needle cases or needle books furnished with assortments of needles or combinations of needles and other articles, (25) 20 per cent. ad valorem; but no articles other than the needles which are specifically named in this section shall be dutiable as needles unless having an eye and fitted and used for carrying a thread.

138. Fishhooks, fishing rods and reels, artificial flies, artificial baits, snelled hooks, and all other fishing tackle or parts thereof, not specially provided for in this section, except fishing lines, fishing nets and seines, 30 per cent. ad valorem: Provided, that no article of fishing tackle herein named shall be imported having attached thereto any of the feathers the importation of which is prohibited by this act.

139. Steel plates engraved, stereotype plates, electrotype plates, halftone plates, photogravure plates, photo-engraved plates, and plates of other materials, engraved for printing, plates of iron or steel engraved or fashioned for use in the production of designs, patterns, or impressions on glass in the process of manufacturing plate or other glass, 15 per cent. ad valorem; lithographic plates of stone or other material engraved, drawn, or prepared, and wet transfer paper or paper prepared wholly with glycerin, or glycerin combined with other materials, containing the imprints taken from lithographic plates, 25 per cent. ad valorem.

140. Rivets, studs, and steel points, lathed, machined, or brightened, and rivets or studs for non-skidding automobile tires, and rivets of iron or steel, not specially provided for in this section, 20 per cent. ad valorem.

141. Crosscut saws, mill saws, pit and drag saws, circular saws, steel band saws, finished or further advanced than tempered and polished, hand, back, and all other saws, not specially provided for in this section, 12 per cent. ad valorem.

142. Screws, commonly called wood screws, made of iron or steel, not more than one-half of an inch in length, 5 per cent. ad valorem; over one-half of an inch and not more than one inch in length, 10 per cent. ad valorem; over one inch in length, 25 per cent. ad valorem.

143. Umbrella and parasol ribs and stretchers, composed in chief value of iron, steel or other metal, in frames or otherwise, and tubes for umbrellas, wholly or partially finished, 35 per cent. ad valorem.

144. Wheels for railway purposes, or parts thereof, made of iron or steel, and steel-tired wheels for railway purposes, whether wholly or partly finished, and iron or steel locomotive, car, or other railway tires or parts thereof, wholly or partly manufactured, 25 per cent. ad valorem: Provided, that when wheels for railway purposes, or parts thereof, of iron or steel, are imported with iron or steel axles fitted in them, the wheels and axles together shall be dutiable at the same rate as is provided for the wheels when imported separately.

145. Aluminum, aluminum scrap, and alloys of any kind in which aluminum is the component material of chief value, in crude form, 2 cents per lb.; aluminum in plates, sheets, bars, strips, and rods, 3½ cents per lb.; barium, calcium, magnesium, sodium, and potassium,

and alloys of which said metals are the component material of chief value, 25 per cent. ad valorem.

146. Antimony, as regulus or metal, 10 per cent. ad valorem; antimony, oxide salts, and compounds of, 25 per cent. ad valorem.

147. Argentine, albata, or German silver, unmanufactured, 15 per cent. ad valorem.

148. Bronze powder, brocades, flitters, and metallics, 8 cents per lb.; bronze, or Dutch-metal or aluminum, in leaf, 4 cents per 100 leaves.

149. Copper, in rolled plates, called braziers' copper, sheets, rods, strips, pipes, and copper bottoms, sheathing or yellow metal and composition metal including brass, copper, and nickel alloys of which copper is the component material of chief value, and not composed wholly or in part of iron ungalvanized, 5 per cent. ad valorem.

150. Gold leaf, 35 per cent. ad valorem.

151. Silver leaf, 30 per cent. ad valorem.

152. Tinsel wire, lame or lahn, made wholly or in chief value of gold, silver, or other metal, 10 per cent. ad valorem; bullions and metal threads, made wholly or in chief value of tinsel wire, lame or lahn, (30) 25 per cent. ad valorem; fabrics, ribbons, beltings, toys, or other articles, made wholly or in chief value of tinsel wire, lame or lahn, or of tinsel wire, lame or lahn, and india rubber, bullions, or metal threads, not specially provided for in this section, 40 per cent. ad valorem.

153. Hooks and eyes, metallic, snap fasteners and clasps by whatever name known, belt buckles, trousers buckles, and waistcoat buckles made wholly or partly of iron or steel, steel trousers buttons and metal buttons not specially provided for in this section, all the foregoing and parts thereof, 15 per cent. ad valorem.

154. Lead-bearing ores of all kinds containing more than 3 per cent. of lead, (one-half) three-fourths of one cent per lb. on the lead contained therein. [Here follows the former long administrative clause.—EDITOR.]

155. Lead dross, lead bullion or base bullion, lead in pigs and bars, lead in any form not specially provided for in this section, old refuse lead run into blocks and bars, and old scrap lead fit only to be remanufactured; lead in sheets, pipe, shot, glaziers' lead, and lead wire; all the foregoing, 25 per cent. ad valorem.

156. Metallic mineral substances in a crude state, and metals unwrought, whether capable of being wrought or not, not specially provided for in this section, 10 per cent. ad valorem; monazite sand and thorite; thorium, oxide of and salts of; gas, kerosene, or alcohol mantles treated with chemicals or metallic oxides, 25 per cent. ad valorem; and gas-mantle scrap consisting in chief value of metallic oxides, 10 per cent. ad valorem.

157. Nickel, nickel oxide, alloy of any kind in which nickel is a component material of chief value, in pigs, ingots, bars, rods, or plates, 10 per cent. ad valorem; sheets or strips, 20 per cent. ad valorem.

158. Pens, metallic, 8 cents per gross; with nib and barrel in one piece, 12 cents per gross.

159. Penholder tips, penholders and parts thereof, gold pens, fountain pens, and stylographic pens; combination penholders, comprising penholder, pencil, rubber eraser, automatic stamp, or other attachment, 25 per cent. ad valorem.

160. Pins with solid heads, without ornamentation, including hair, safety, hat, bonnet, and shawl pins; any of the foregoing composed wholly of brass, copper, iron, steel, or other base metal, not plated with gold or silver, and not commonly known as jewelry, 20 per cent. ad valorem.

161. Quicksilver, 10 per cent. ad valorem. The flasks, bottles, or other vessels in which quicksilver is imported shall be subject to the same rate of duty as they would be subjected to if imported empty.

162. Type metal, and types, 15 per cent. ad valorem.

163. Watch movements, including time-detectors, whether imported in cases or not, watchcases and parts of watches, chronometers, box or ship, and parts thereof, lever clock movements having jewels in the escapement, and clocks containing such movements, all other clocks and parts thereof, not otherwise provided for in this section, whether separately packed or otherwise, not composed wholly or in chief value of china, porcelain, parian, bisque, or earthenware, 30 per cent. ad valorem; all jewels for use in the manufacture of watches, clocks, or meters, 10 per cent. ad valorem; enameled dials and dial plates for watches or other instruments, 30 per cent. ad valorem: Provided, that all watch and clock dials, whether attached to movements or not, shall have indelibly painted or printed thereon the name of the country of origin, and that all watch movements, and plates, lever clock movements with jewels in the escapement, whether imported assembled or knocked down for reassembling, and cases of foreign manufacture, shall have the name of the manufacturer and country of manufacture cut, engraved, or die-sunk conspicuously and indelibly on the plate of the movement and the inside of the case, respectively, and the movements and plates shall also have marked thereon by one of the methods indicated the number of jewels and adjustments, said numbers to be expressed either in words or in Arabic numerals; and if the movement is not adjusted, the word "unadjusted" shall be marked thereon by one of the methods indicated; and none of the aforesaid articles shall be delivered to the importer unless marked in exact conformity to this direction.

164. Zinc-bearing ores of all kinds, including calamine, (10) 12½ per cent. ad valorem.

165. Zinc in blocks, pigs, or sheets, and zinc dust; and old and worn-out zinc fit only to be remanufactured, (10) 15 per cent. ad valorem.

166. Bottle caps, collapsible tubes, and sprinkler tops, if not decorated, colored, waxed, lacquered, enameled, lithographed, electroplated, or embossed in color, 30 per cent. ad valorem; if decorated, colored, waxed, lacquered, enameled, lithographed, electroplated, or embossed in color, 40 per cent. ad valorem.

167. All steam engines, steam locomotives, printing presses, and machine tools, 15 per cent. ad valorem; embroidering machines, and lace-making machines, including machines for making lace curtains, nets, or nettings, 25 per cent. ad valorem; machine tools as used in this paragraph shall be held to mean any machine operated by other than hand power which employs a tool for working on metal.

168. Nippers and pliers of all kinds wholly or partly manufactured, 30 per cent. ad valorem.

169. Articles or wares not specially provided for in this section; if composed wholly or in part of platinum, gold, or silver, and articles or wares plated with gold or silver, and whether partly or wholly manufactured, 50 per cent. ad valorem; if composed wholly or in chief value of iron, steel, lead, copper, nickel, pewter, zinc, aluminum, or other metal, but not plated with gold or silver, and whether partly or wholly manufactured, 25 per cent. ad valorem.

Free List

401. Agricultural implements: Plows, tooth and disk harrows, headers, harvesters, reapers, agricultural drills and planters, mowers, horserakes, cultivators, thrashing machines, cotton gins, beet and sugar cane machinery, wagons and carts, and all other agricultural implements of any kind and description, whether specifically mentioned herein or not, whether in whole or in parts, including repair parts.

412. Articles the growth, produce, or manufacture of the United States, when returned after having been exported, without having been advanced in value or improved in condition by any process of manufacture or other means; steel boxes, casks, barrels, carboys, bags, and other containers or coverings of American manufacture exported filled with American products, or exported empty and returned filled with foreign products, including shooks and staves when returned as barrels or boxes; also quicksilver flasks or bottles, iron or steel drums of either domestic or foreign manufacture, used for the shipment of acids, or other chemicals, which shall have been actually exported from the United States; but proof of the identity of such articles shall be made, under general regulations to be prescribed by the Secretary of the Treasury, but the exemption of bags from duty shall apply only to such domestic bags as may be imported by the exporter thereof, and if any such articles are subject to internal revenue tax at the time of exportation, such tax shall be proved to have been paid before exportation and not refunded; photographic dry plates or films of American manufacture, (except moving-picture films), exposed abroad, whether developed or not, and films from moving-picture machines, light struck or otherwise damaged, or worn out, so as to be unsuitable for any other purpose than the recovery of the constituent materials, provided the basic films are of American manufacture, but proof of the identity of such articles shall be made under general regulations to be prescribed by the Secretary of the Treasury; articles exported from the United States for repairs may be returned upon payment of a duty upon the value of the repairs under conditions and regulations to be prescribed by the Secretary of the Treasury: Provided, that this paragraph shall not apply to any article upon which an allowance of drawback has been made, the reimportation of which is hereby prohibited except upon payment of duties equal to the drawbacks allowed; or to any article manufactured in bonded warehouse and exported under any provision of law: And provided further, that when manufactured tobacco which has been exported without payment of internal revenue tax shall be reimported it shall be retained in the custody of the collector of customs until internal revenue stamps in payment of the legal duties shall be placed thereon. And provided further, that the provisions of this paragraph shall not apply to animals made dutiable under the provisions of paragraph 405.

421. Bells, broken, and bell metal, broken, and fit only to be remanufactured.

439. Brass, old brass, clippings from brass or Dutch metal, all the foregoing, fit only for remanufacture.

450. Cash registers, linotype and all type-setting machines, sewing machines, typewriters, shoe machinery, cream separators, sand blast machines, sludge machines, and tar and oil spreading machines used in the construction and maintenance of roads and in improving them by the use of road preservatives; all the foregoing whether imported in whole or in parts, including repair parts.

456. Chromate of iron or chromic ore.

457. Chromium, hydroxide of, crude.

459. Coal, anthracite, bituminous, culm, slack, and shale; coke; compositions used for fuel in which coal or coal dust is the component material of chief value, whether in briquettes or other form.

461. Cobalt and cobalt ore.

468. Composition metal of which copper is the component material of chief value, not specially provided for in this section.

469. Copper ore; regulus of, and black or coarse copper, and copper cement; old copper, fit only for remanufacture; copper scale, clippings from new copper and copper in plates, bars, ingots, or pigs, not manufactured or specially provided for in this section.

478. Curling stones, or quoits, and curling-stone handles.

486. Emery ore and corundum, and crude artificial abrasives.

513. Hoop or band iron, or hoop or band steel, cut to lengths, or wholly or partly manufactured into hoops or ties, coated or not coated with paint or any other preparation, with or without buckles or fastenings, for baling cotton or any other commodity.

522. Iron ore, including manganiferous iron ore, and the dross or residuum from burnt pyrites; iron in pigs, iron kentledge, spiegeleisen, wrought iron and scrap and scrap steel; but nothing shall be deemed scrap iron or scrap steel except second-hand or waste or refuse iron or steel fit only to be remanufactured; ferromanganese; iron in slabs, blooms, loops or other forms less finished than iron bars, and more advanced than pig iron except castings.

526. Junk, old.

543. Manganese, oxide and ore of, natural.

553. Minerals, crude, or not advanced in value or condition by refining or grinding, or by other process of manufacture, not specially provided for in this section.

555. Models of inventions and of other improvements in the arts, to be used exclusively as models and incapable of any other use.

558. Cut nails and cut spikes of iron or steel, horseshoe nails, hobnails, and all other wrought-iron or steel nails not specially provided for in this section; wire staples, wire nails made of wrought iron or steel, spikes, and horse, mule, or ox shoes, of iron or steel, and cut tacks, brads, or sprigs.

559. Needles, hand sewing and darning, and needles for shoe machines.

577. Pewter and britannia metal, old, and fit only to be remanufactured.

583. Plumbago.

591. Railway bars, made of iron or steel, and railway bars made in part of steel, T rails, and punched iron or steel flat rails.

601. Shotgun barrels, in single tubes, forged, rough bored.

615½. Steel ingots, cogged ingots, blooms and slabs, die blocks or blanks, and billets, if made by the Bessemer, Siemens-Martin, open-hearth or similar processes, not containing alloy, such as nickel, cobalt vanadium, chromium, tungsten, wolfram, molybdenum, titanium, iridium, uranium, tantalum, boron, and similar alloys.

633. Tin ore, cassiterite or black oxide of tin, tin in bars, blocks, pigs, or grain or granulated, and scrap tin: Provided, that there shall be imposed and paid upon cassiterite, or black oxide of tin, and upon bar, block, pig tin and grain or granulated, a duty of 4 cents per pound when it is made to appear to the satisfaction of the President of the United States that the mines of the United States are producing 1500 tons of cassiterite and bar, block and pig tin per year. The President shall make known this fact by proclamation, and thereafter said duties shall go into effect.

639. Type, stereotype metal, electrotype metal, linotype composition, all of the foregoing, old and fit only to be remanufactured.

647. All barbed wire, galvanized wire not larger than twenty one-hundredths of one inch in diameter and not smaller than eight one-hundredths of one inch in diameter of the kind commonly used for fencing purposes, galvanized wire fencing composed of wires not larger than twenty one-hundredths of one inch in diameter, not smaller than eight one-hundredths of one inch in diameter, and wire commonly used for baling hay or other commodities.

The U. S. Steel Corporation Dissolution Suit

Director Reed of the Corporation, President Coulby of Pittsburgh Steamship Company, President Lynch of Frick Coke Company, and Sales Manager Davis of American Bridge Company Examined

Comptroller Filbert Cross-Examined

On Wednesday, June 18, Comptroller William J. Filbert was cross-examined by Judge Dickinson, who asked if he knew of any prices published by the Steel Corporation, and if such prices were changed when special contracts were made with the American Can Company or the Standard Oil Company. Mr. Filbert replied he knew nothing regarding the differences between any published prices and contracts made by the corporation. Mr. Reed, of counsel for the corporation, then read into the record from cross-examination of Judge Gary in which the latter testified that the Steel Corporation does not issue price lists to trade papers for publication, but prefers to advise the trade of market conditions and prices through market letters.

Judge Dickinson then questioned Mr. Filbert regarding the acquisition of the Tennessee Coal, Iron & Railroad Company. He mentioned an order of 167,500 tons of rails placed by E. H. Harriman with the Tennessee Company, prior to its being taken over by the corporation, and contended that at that time the company was a strong competitor of the corporation. Mr. Filbert said that only a part of the rail order had been delivered when the company was taken over and the remainder of the order was filled after the corporation took charge. He said it was necessary to spend $20,000,000 in improving the Tennessee Company's property after being acquired. Mr. Filbert was excused until he could obtain some records of plant operations.

Director James H. Reed on the Stand

Former Judge James H. Reed, of Pittsburgh, now a director of the corporation and formerly chairman of the Carnegie Steel Company, was apparently called to show that the Carnegie Company was not forced to sell out, as asserted by the prosecution. The Government is trying to prove that J. P. Morgan forced the sale of the Carnegie Steel Company in order to suppress a dangerous competitor.

Mr. Carnegie Anxious to Sell

Judge Reed said that both Henry C. Frick and Andrew Carnegie were anxious to sell their property. At the time of the consolidation Judge Reed and his partner, Philander C. Knox, were counsel for the Carnegie Company, and Mr. Knox handled the famous "Masie options" for the purchase of the property. Judge Reed said that Mr. Morgan had arrived at an understanding with Mr. Carnegie for the sale of the Carnegie plants, but in the course of organizing the United States Steel Corporation he realized that in the event of the sudden death of Mr. Carnegie he would have nothing to show that such an agreement existed. He added:

Mr. Morgan, thereupon, instructed Francis Lynde Stetson and me to run up and see Mr. Carnegie. We found him at home. He was in his library, where a secretary was taking dictation and opening mail. There seemed to be a bushel of letters, mostly asking for aid. There were so many lettters that a boy had been sent up from the Carnegie Steel Company's offices to open them. We asked Mr. Carnegie to dictate a leter that the bankers wanted, and he did.

Judge Reed said that he did not have a copy of this letter, and he had been unable to find one at Mr. Carnegie's house. He told Mr. Lindabury, counsel for the Steel Corporation, that he could not identify the letter now if he were to see it. He added:

However, the letter was not necessary anyway. Mr. Carnegie, Mr. Stetson, and I called on Mr. Morgan. We talked about 15 minutes, and then Mr. Carnegie said: "Pierpont, I am the happiest man in the world. I have unloaded all my burdens from my back to yours, and I am going off to play." Soon afterward he sailed for Europe.

No Monopoly Intended

In answer to questions put by Mr. Lindabury, Judge Reed denied that in the course of the organization of the corporation any mention was made of monopoly. He said it never was intended to establish a monopoly or to suppress competition.

Asked for his impression of the Steel Corporation's treatment of competitors, Judge Reed said:

My education with the Carnegie Company had been to go out and get the business. It was the policy of the Steel Corporation to treat competitors with exceeding fairness—I might almost say with Christian forbearance. I think that if I had held Judge Gary's place I should have occasionally hit somebody over the head.

He had attended the so-called Gary dinners to steel manufacturers, but said that he had never heard of any agreement or understandings to fix prices. He added:

Judge Gary used to exhort us like a Methodist preacher in a camp meeting, telling us not to cut prices, but to get everything in our own mitt. The policy he laid down saved a thousand men from bankruptcy after 1907. If prices had gone down, ruin for many manufacturers and dealers would have resulted.

At the time of the first Gary dinner, held during the panic, the steel industry, he said, looked "as blue as could be." He said that he had been through several panics when steel mills closed and men had to sleep in the parks. In 1907, he said, the Steel Corporation, to a large extent, saved the day by "keeping cool" and waiting until better times should come. He insisted that there was no understanding by nod, wink, unexpressed sign or cabalistic mark by which the diners were to do anything other than Judge Gary asked them at the dinner to do.

Important Letter of Andrew Carnegie Made Public

At the hearing on June 18 letters exchanged between Mr. Carnegie and J. P. Morgan & Co., showing that the former received $225,639,000 in bonds for his interest in the Carnegie Company, were identified by Judge Reed.

In a letter dated February 26, 1901, now made public for the first time, which Mr. Carnegie dictated in the presence of Judge Reed and Francis Lynde Stetson, he said he was making a statement to afford "a basis for your further proceeding in connection with your negotiations with the United States Steel Corporation." After making reference to the amount of the issue of preferred and common stocks of the new corporation, Mr. Carnegie wrote:

The stocks of the United States Steel Corporation are to be received by the syndicate represented by you, and a portion thereof is to be delivered in payment and exchanged for stocks of the companies hereinafter named, provided that in no instance shall there be received less than two-thirds of the total outstanding stock of either of said companies.

The letter further specified that the syndicate was to retain the shares of stock to be issued in excess of the amounts deliverable for the aggregate amount of such shares of the companies referred to and the syndicate in turn was to pay a certain amount in cash to the new corporation. The companies that Mr. Carnegie mentioned were the Carnegie Steel Company, Federal Steel Company, National Steel Company, American Steel & Wire Company of New Jersey, National Tube Company, American Sheet Steel Company, American Steel Hoop Company and American Tin Plate Company.

Mr. Carnegie's letter further said he was ready to deliver to J. P. Morgan & Co. $86,145,000 5 per cent. bonds of the Carnegie Company, of which by the way there was a total of $160,000,000 outstanding, and also 92,996 shares of the capital stock of the company of which there were 160,000 shares outstanding. Then Mr. Carnegie wrote: "And

(Continued on page 1568)

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CONTENTS.

A New Electrically Driven Sheet Mill..... 1529
The Production of Iron Ore in 1912..... 1533
Shelby Iron Company's Annual Report..... 1533
The New Selective Head Lathe..... 1534
Cold-Blast Charcoal Furnace in Mississippi..... 1535
Canada Steel Corporation, Ltd..... 1535
Rail Failures and Their Chief Causes..... 1536
Another Open-Hearth Steel Plant at Cleveland..... 1538
Growth of the Goldschmidt Companies..... 1539
A Compact Heavy Knuckle Joint Press..... 1539
Determination of Oxygen in Iron and Steel..... 1540
Induction Motor Safeguarding..... 1542
Six-Crank Bending and Punching Press..... 1543
Science Applied to Industrial Management..... 1544
An Electric Machine Tachometer..... 1546
A New Type of Multiple Disk Brake..... 1546
Vertical Machine for Boring Cylinders..... 1547
New England Iron and Hardware Association..... 1547
Grinding Machine Equipped with a Crane..... 1548
Handling Heavy Ingots with a Rotating Block..... 1548
Underwood-Simmons Metal Tariff Schedule.....Supplement
The U. S. Steel Corporation Dissolution Suit..... 1549
Steel Requirements and Productive Capacity..... 1550
A Course in Business Psychology..... 1551
The Future of Bessemer Steel..... 1552
Correspondence..... 1552
The Sheet and Tin Plate Scales Settled..... 1553
The Iron and Metal Markets..... 1554
A New Flexible Metallic Hose..... 1566
Personal..... 1567
Obituary..... 1567
Imataca Iron Mine Improvements..... 1567
The Testing Society's 16th Annual Meeting..... 1569
Youngstown's Growth in Iron and Steel..... 1571
Shop Trips by Superintendents and Foremen..... 1571
Pittsburgh and Vicinity Business Notes..... 1571
Influence Affecting Engineering Practice..... 1572
Pittsburgh's Remarkable Freight Movement..... 1574
The Machinery Markets..... 1575
Trade Publications..... 1584

Steel Requirements and Productive Capacity

An element which has been making for strength in the steel situation for some months is that the increase in capacity in recent years has been relatively small. This fact appears not to be generally apprehended. The strenuous nature of the slump in demand which occurred toward the close of 1907, and the large amount of new erection then in progress made such an impression that it is not always realized that that time was six years ago. A fresh suggestion that demand would with difficulty grow up to the capacity was furnished by the experience of 1909-10, which showed that while for a short time the full capacity was engaged, the product went in considerable measure into stocks of jobbers and manufacturing consumers, who took in material because contract prices were much below what had been the openly quoted market. Even that period, however, is more than three years past, and demand has had much chance to grow meanwhile.

There is a tendency to overrate the amount of new construction which has been in progress in the steel industry, through an unconscious use of standards which are out of date. From 1899 to 1907 our productive capacity in steel more than doubled, and thus a new plant to make 250,000 or 500,000 tons of steel a year represented less than half as large a percentage increase in total capacity in 1907 as it would have represented in 1899. But throughout all the past the consistent rule of growth in pig iron and in steel has been one of percentage over the previous capacity, not one of absolute tonnage year by year; in other words, the growth has hitherto been in geometrical, not in arithmetical, progression. A new plant of given size is much less felt, in the aggregate, than it was twelve years or even six years ago. Another cause which leads to overestimating the pace of new construction is the longer time required to complete new plants. For the average productive unit this time has nearly doubled in, say, the past ten years. If the time has doubled in ten years it would be true that to get the same annual increase in tonnage capacity twice as much new construction must constantly be in progress. Assuming for argument also that capacity has doubled in ten years, it would follow that for a similar percentage increase in capacity to be in progress, there must be four times as much new construction on foot at any given time as would have been required ten years ago.

Of course, it cannot be proved absolutely that demand for steel products in general has increased as rapidly from 1907 to the present time as from 1901 to 1907, for instance, both being periods of six years; but there are excellent reasons for inferring that there has been a fairly continuous increase in the ultimate requirements, whether or not they be definitely and positively expressed from month to month or year to year by the test of actual purchases. A citation of interest and of positive value is that the production of sheets and black plates increased from 1906 (there was a smaller production in 1907) to 1912 by no less than 72 per cent. In no respect did these products supplant other steel products; and if they could so grow, one can hardly deny that other steel products can also grow. A similar percentage increase in all steel products would have given us 40,000,000 tons of steel ingots and castings last year, or a quantity

millions of tons in excess of our prospective capacity, when all new construction now in progress is completed. Another citation is that our iron and steel exports this year show a 35 per cent. gain over 1907. These citations are not conclusive, but they are strongly suggestive of what can occur in other directions.

Frequently one can learn much as to the real relation between demand and productive capacity by closely comparing the rate of production and the apparent demand as shown by market transactions. Now, our monthly blast furnace returns show that as early as in May, 1912, the steel works blast furnaces attained a rate of pig iron production of 62,018 tons daily. In the intervening time, to the present, the highest rate attained was the 64,658 tons shown last April. Certainly at some time in this movement a rate of production substantially equal to capacity has been achieved, but we find that as early as May last year the rate was only 4 per cent. less than the capacity rate thus disclosed. Observing market conditions, however, we note that it was months later before demand was regarded as really insistent. Plainly an amount of material substantially equal to the full productive capacity was being absorbed long before the maximum of demand was experienced. *Per contra*, we now see the steel mills running practically full when the demand as suggested by new purchases is very light. The peak of the load, as shown by market purchases, has been spread out. It may readily be imagined that had capacity been one-half greater than it was, the productive rate of May, 1912, would not have been attained until later, while the present productive rate would be smaller, and between these times there would have been a period of much larger production.

Witness, for comparison, the record of the 1909-10 rise and fall in production. The maximum rate of the steel works blast furnaces was reached in February, 1910, being 57,876 tons daily. Six months earlier the rate had been 11 per cent. less, and six months later it was 20 per cent. less. There was a relatively sharp peak in the curve of production, whereby reasonably full production was maintained for only six months. In the present movement, on the other hand, practically full production has now been maintained for more than a twelve-month.

The comparison is suggestive, if not conclusive, that the actual, ultimate demand has increased in recent years much more than has the capacity. It is reasonable to think that demand has very materially increased, while capacity has increased less, and thus the filling of the demand is spread over a greater period of time.

This is more like what it should be. The conditions under which the steel industry has hitherto labored have been decidedly uneconomical. We seem to be working toward a better relation of capacity and demand and it is to be hoped that we really are. One can readily imagine the steel maker of a decade hence looking back upon the benighted times in the infancy of the industry, when at enormous capital outlay a large capacity was provided, in the hope that now and then the entire capacity would by chance be employed for a few months. In the old days of wrought iron the capital outlay per ton of output was relatively small, and the wage disbursements relatively large. The periods of depression fell largely upon labor, while capital fared less hardly, though not well by any means. To-day the machinery of steel making is so vast, per ton of output, that alternate periods of prince and pauper, delayed deliveries and insufficient employment, are illogical and wasteful. Steel products cannot be carried in stock to any extent, and the actual requirements of the people should be so arranged that reasonably steady employment of the steel mills may be continuous. There is reason to conclude that actual demand has so grown that it closely approximates the present capacity, and that steadier employment is promised for the next few years than has been given during the past few years.

A Course in Business Psychology

The Massachusetts Institute of Technology is considering the establishment of a course which tentatively has been given the name of "engineering and business administration." The question has had the careful consideration of a special committee of the alumni, which has just made a wholly favorable report. One suggestion made is for the inclusion of the subject of "industrial psychology." The idea is that graduates as engineers have to deal with men as well as scientific details and materials. To be a leader it is necessary that the engineer have a practical knowledge of the efficiency of the labor he commands, which depends for a large part upon the assignment of the individual to the work that best fits him.

A well-recognized weakness of many graduates of the engineering schools is the lack of that knowledge of human nature which the student taking a general college course absorbs by "mixing." It is noticed, too, that the lad who does not get beyond the common or high school is later at a certain advantage because of his experience in a business atmosphere while still in his teens. The engineering student is given a very stiff course. His time is well occupied in the recitation room, drafting room and laboratory, and his training is specialized rather than broad. Even in the vacation periods many of these young men take up work in the line which they are following in their courses. Those engaged in the education of engineers recognize frankly the narrowing influence of this kind of training. They welcome to their institutions the graduate of a college, and there is some tendency to adjust courses to shorten for him the time needed in securing the degree of bachelor of science.

The college course in business is by no means new, but, for a technical school like the Massachusetts Institute it presents special problems. These have been worked out with much care, and will receive further investigation before they are considered finally settled. The student will specialize along his selected profession, of mechanical, civil, metallurgical or other branch of engineering. He will give 25 per cent. of his time to economic subjects, 59 per cent. to engineering subjects, and 16 per cent. to general subjects, including languages. English will be given prominence, with the special purpose of securing skill in preparing reports. It has been suggested that the department of industrial organization be modeled after the Harvard graduate school, and that of accounting after the Tuck school of Dartmouth. Co-operation with Harvard is considered wholly possible in the new course.

Elsewhere, courses such as these have been success-

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PITTSBURGH, PA.

ful, large numbers of students selecting them. That at Boston should make a strong answer to the demand for a broader training in our engineering schools.

The Future of Bessemer Steel

The Bessemer steel industry is not so decadent as a superficial glance at the statistics would suggest.

It is true the 1912 output fell short of that in either 1905, 1906 or 1907. The decrease from 1906, the record year, to 1912 was from 12,275,830 tons to 10,327,901 tons, or 15.9 per cent. In the American iron and steel trade a product is normally expected to show a large increase in an interval of six years, not a decrease, but the case of Bessemer steel is peculiar. Directly it has lost ground as material for rails, plates and structural shapes, through the definite requirements of engineers, but sentimentally it has lost ground with some users who have specified open-hearth steel, not because they had knowledge that open-hearth steel was distinctly better than Bessemer for their purposes, but merely because such a course appealed to them as being on the safe side. A prejudice has been created, and it is not impossible that this prejudice may be reduced.

A simple comparison can be made which shows that Bessemer steel is not at the present time tending to lose ground continuously. Its greatest loss has been as rail material, but already in 1912 the proportion of Bessemer rails had dropped to 33 per cent., contrasted with 95 per cent. in 1906. Deducting ingots used in Bessemer rail manufacture, the amount produced in 1906 was 7,500,000 tons, and in 1912 8,885,000 tons, of Bessemer steel ingots used for other rolling purposes. This was a gain of 18.5 per cent., which is no small item. In the matter of rails Bessemer steel has little more to lose, and in other outlets it is hardly likely to lose any more rapidly in the next six years than it has lost in the past six. Should the total output of steel continue to increase as it has in the past, Bessemer steel can still lose ground relatively, but make up ground absolutely.

Besides this, there always remains the possibility of such an improvement as will restore some of its prestige to Bessemer steel, or even give it greater prestige than ever. The friends of the electric steel refining process assert that this is not a possibility; it is a distinct probability. If, indeed, the process can be conducted cheaply, there is every reason to expect that it will be used very largely in the refining of Bessemer material, and perhaps it will be almost exclusively so applied.

Correspondence

American Federation of Stockholders Proposed

To the Editor:—Why not the "American Federation of Stockholders?" Of all the evil results from the increasing power and control of closed-shop unionism in industry, the stockholder is the residuary legatee. Decreased efficiency, disorganization, petty and uneconomic restrictions, the arbitrary control of the delegate—all these in the last analysis must be paid for by the stockholder, either in lessened dividends or, as the I. W. W. frankly demands, in the entire loss and confiscation of property invested in the business.

The purpose of such an organization would be to inform the stockholder on industrial matters and as to how his interests are affected, to develop his intelligent self-interest in such matters and to furnish an effective medium through which the combined stockholders of the country could make their influence felt. Its first and most obvious function would be to offset in local, State and national legislative bodies the supposed political influence of organized labor. Unreal as this is by repeated demonstration, the bogie yet remains and is of such practical potency as to make the real existence of the power an academic question. The bogie gets results in the form of vicious, unfair and uneconomic class legislation with no shadow of excuse save the demand of militant unionism for its passage.

LABOR UNION INFLUENCE FOCUSED ON LEGISLATION

Note, for instance, the "full crew" railroad measure (more correctly, the *over*-full crew), recently passed by the Legislature of New York and signed by the Governor in accordance, as is claimed, with a pre-election promise to the unions. This law compels the employment of surplus, unnecessary men, which means not only a useless increase in the payroll, but an actual decrease in efficiency and discipline. The same Governor, at the demand of organized labor, has vetoed a workmen's compensation act chiefly because it does not provide schedules of compensation nearly a third higher than any that obtain in any State or country where such acts are in existence. In the movement toward securing the adoption of workmen's compensation in this country is everywhere met the radical demand of organized labor for extreme provisions in the law and the equally insistent demands of socialists and other theoretical reformers that our State governments embark upon all sorts of untried and socialistic schemes. Our Congress has recently passed an appropriation measure providing that none of the moneys appropriated to the Department of Justice shall be used to prosecute labor unions, notwithstanding the fact that the same Department of Justice is at present vigorously prosecuting a number of actions against other classes of citizens under the anti-trust act, and is busily engaged in preparing to begin more actions of the same kind. The President, the chief official representative of all the people, even now hesitates in his disposition of such a measure, and is seemingly endeavoring to find some plausible pretext by which he can affix his signature and make it into law.

PRESIDENT WILSON ON UNION RESTRICTIONS

That the powerful closed-shop unions of the American Federation of Labor deliberately restrict output and limit production, and that their control in any business results inevitably in decreased efficiency of labor, is a matter of common knowledge among all those who have any practical acquaintance with actual conditions. It was well known to Mr. Wilson, when he delivered his baccalaureate sermon at Princeton on June 13, 1909. The New York Times editorially quotes from this sermon as follows:

> "You know what the usual standard of the employee is in our day. It is to give as little as he may for his wages. Labor is standardized by the trades union, and this is the standard to which it is made to conform. No one is suffered to do more than the average workman can do. In some trades and handicrafts no one is suffered to do more than the least skillful of his fellows can do within the hours allotted to a day's labor, and no one can work out of hours at all or volunteer anything beyond the minimum.
>
> "I need not point out how economically disastrous such a regulation of labor is. It is so unprofitable to the employer that in some trades it will presently not be worth his while to attempt anything at all. He had better stop altogether than to operate at an inevitable and invariable loss. The labor of America is rapidly becoming unprofitable under its present regulation by those who have determined to reduce it to a minimum. Our economic supremacy may be lost because the country grows more and more full of unprofitable servants."

UNION FINES FOR "RUSHING" WORK

A United States Commissioner of Labor (Carroll D. Wright) has made an exhaustive report demonstrating the same general fact. Note some of the provisions in the by-laws and constitutions of closed-shop unions, as quoted in this report:

> "Any member who does an unreasonable amount of work, or who acts as a leader for his employer for

the purpose of getting all the work possible out of the men working in the same shop or job with him, shall be fined for the first offense $10; for the second offense he shall be suspended or expelled."

Another rule: "Any member guilty of excessive work or rushing on any job shall be reported and shall be subject to a fine of $5. Any foreman using abusive language to or rushing the men under his supervision, shall be fined not less than $10 and ruled off the job."

There is no need to multiply these examples. They are typical of conditions wherever the closed-shop militant union of today finds itself strong enough to make such rules and enforce them. The compulsory employment of unnecessary men has also been common for some time under closed-shop union rules, usually as a condition upon which the employer is permitted to use labor-saving machinery. The "full crew" law, therefore, simply gives the sanction and authority of government to an uneconomic union principle.

EFFICIENCY SYSTEMS UNDER GOVERNMENT BAN

So far as our national government is concerned the situation at the moment is reduced to a colossal absurdity. The closed-shop union stands opposed in all its practices to efficiency or increased productivity on the part of labor. It successfully opposed last year the introduction generally into the government service of a well-proved efficiency system. Only recently, Secretary Daniels, at its demand, has discontinued in his department the use of this efficiency system in the face of a most excellent record of its merit and of the high recommendation of the departmental officers. And Congress, under the same pressure, passes a law, the purpose of which is to give practical immunity from prosecution to the closed-shop union in the use of any methods it may see fit to adopt in order further to fasten its uneconomic, restrictive, efficiency-lessening principles and practices upon the industries of the nation. Yet Secretary Redfield, speaking for the same administration, tells the manufacturers of the country that the government expects them to meet a reduced tariff with greater efficiency and increased productivity, and that any wage reductions will be viewed with suspicion and investigated.

STOCKHOLDERS PAY THE BILLS

If the millions of stockholders of this country were organized and had made themselves heard on these questions, in pursuance of an intelligent self-interest, would not our lawmakers and executive officers have a different conception of the necessity and desirability of such measures, and perhaps also a better recognition of the proper functions of the government? The final cost of all such legislation, for there is a final cost, must be met by the stockholder. Is it not time that he took an interest in his own affairs?

Another obvious and natural thing that such an association of stockholders could do would be to exert an influence in the molding of public opinion on industrial questions, especially when they reached the acute stage. Now, clever manipulation by interested labor leaders, maudlin sympathy on the part of the public, academic and theoretical notions on the part of reformers, all added to a mass of misleading statements as to the actual facts, go to make up in many cases the general public opinion in time of labor trouble. As a result, communities are terrorized, the arm of the law is paralyzed, and property and business and good-will, which now seem to have little if any standing, are left defenseless and unprotected. Again, it is the stockholder who pays the final bill. With an association of stockholders, correct information could be given in all industrial matters, and each stockholder could become a center for the spread of right opinion and authoritative facts. The association itself could also take measures to secure publicity for the truth and to offset and correct false and prejudiced reports.

COMBINED INDIVIDUAL INFLUENCE GREATER THAN CORPORATE

The need for an active interest on the part of the stockholder to protect his interests was never greater than now. The corporation in which his property is invested seems to have, so far as industrial issues are concerned, little or no influence or standing, either in legislative halls or before the bar of public opinion. Its statements are distrusted, its protests unheeded and its suggestions viewed with suspicion. Its interest made known in behalf of any measure or policy is often sufficient to discredit it. In the meantime, labor questions have become the most important with which the business men of our country have to deal. It is not too much to say that the industrial supremacy of this nation for the future depends more upon its solution of labor questions than any other one thing. Just now our business interests find themselves confronted with a period of necessary readjustment to meet changing conditions, and labor problems will be the most important feature of these readjustments. With the growing inability of the corporation itself to meet industrial issues forcefully and effectively has thus come a condition of affairs where those issues have grown in intensity and importance. If they are not solved wisely and well, it is again the stockholder who must ultimately pay the price. Is it not time, therefore, that the stockholders of the country develop a class consciousness, as it were, on industrial issues, that they inform themselves upon the matters which directly and vitally affect them, and that they take steps to express and enforce an intelligent self-interest and to demand and secure respect and recognition for their rights and the rights of corporate business generally?

In short, why not the "American Federation of Stockholders?"

WALTER DREW,
Commissioner National Erectors' Association.

NEW YORK, June 3, 1913.

The Sheet and Tin Plate Scales Settled

At a conference held in West Baden, Ind., last week, and which terminated on Friday, a settlement was reached on the tin plate and sheet mill wage scales between the Amalgamated Association and the tin plate and sheet mills that sign its scales. The base of both scales remains as heretofore, and in the sheet mill scale the only changes made were that the doubler and the matcher were advanced 10 per cent., and the second catcher on jobbing mills 5 per cent. In the tin plate scale the rate for heating was advanced 5 per cent. Some minor changes were made in the foot notes on both scales, but they do not affect the wage rates. The new scales are operative for one year from July 1.

It seems likely there will be a conflict between the Phillips Sheet & Tin Plate Company and the Amalgamated Association, owing to the action of the company in deciding to operate non-union its Pope mill at Steubenville, Ohio. This has always been a union mill, and the Amalgamated Association officials say they do not propose to surrender it without a struggle. The company has announced that the rates of wages posted recently at the plant will prevail on and after July 1, and that no negotiations will be had with the Amalgamated Association or any other labor organization.

The International Steam Pump Company has notified employees of the Fred M. Prescott Steam Pump Company that the latter's works in West Allis, near Milwaukee, Wis., will be abandoned July 1 and that they will have to seek positions elsewhere. The machinery and operations generally will be moved to Cudahy, also near Milwaukee, and consolidated with the shops of the Power & Mining Company, another member of the International Steam Pump Company group. The Prescott works was established in 1903 and about a year ago sold to the International Company. Fred M. Prescott, president and general manager, agreed to continue as such temporarily, and several weeks ago resigned that he might devote his attention to his other extensive interests. About 750 men will thus need other employment but it is unofficially stated that the Allis-Chalmers Mfg. Company will take most of these in preference to outside men, as they are needed.

The fortnightly bulletin of the American Railway Association states that on June 14, on the lines of the United States and Canada, there was a net surplus of 63,927 idle freight cars as compared with 50,908 on May 31, an increase of 13,019. The total number of cars idle, or the gross surplus, was 71,126, against 60,291, while the gross shortage decreased from 9383 to 7199.

The Iron and Metal Markets

Consumption Well Sustained

Jobbers' Stocks Steadily Reduced

Low Pig Iron Prices Lead to Buying—Several Inquiries for Rails

The amount of business going on the books of the steel companies is more than would be looked for in view of the policy of so many buyers to avoid contracting beyond what is absolutely necessary. The railroads, in particular, owing to present restrictions on their financial plans, are for the most part limiting their iron and steel buying to the renewal of contracts for supplies required by their every-day operations. Some of these are just now coming in for the second half of the year.

There is some rail inquiry, but new bridge and car work has been falling off. In addition to the M. K. & T. inquiry for 20,000 tons of rails for early 1914 rolling, and a tentative one from the Burlington for next year, is one for 28,000 tons from the Southern Railway, on which Bessemer or open hearth rails will be taken. In the past week the Steel Corporation sold 18,000 tons to one company and 7000 tons to another.

At Pittsburgh actual orders for plates, bars and steel pipe have been larger thus far in June than in the first 25 days of May, and this statement is put forward as about the extent of encouraging information from that market. Our Chicago report says that in structural shapes, bars and sheets the buying of the past week has been heavier than in 60 days. But at Chicago implement companies have not yet bought bars to the expected amount, though at Cleveland bar business from such companies has recently been more active.

Consumers have not ceased to urge deliveries. That much is clear; and the way in which jobbers' stocks are being drawn down also indicates sustained consumption. Thirty days more may answer the question whether these jobbers will again place large orders with the mills.

Thus far weakness in prices of finished material, apart from an almost complete disappearance of premiums, is chiefly in sheets, wire products and rivets. In semi-finished steel prices are easier in the East. More open hearth furnaces are coming into operation in the Pittsburgh district, and at Cleveland the supply is increased 2500 to 3000 tons a month by added capacity.

With a reduction of $4 a ton on what has been the nominal market for rivets some stimulus has been given to the renewal of contracts expiring this month.

In Eastern districts the structural steel situation has quieted down, and work recently let shows a more aggressive attitude by some fabricators. The Newport News bid is lowest on one to three vessels for the Mallory Line, each requiring 3000 tons of plates and shapes.

New York City will open bids early in July for 15,000 tons of cast-iron pipe, including the reletting of 11,000 tons for the high pressure line.

Pig iron prices have settled to a point at which more buyers are attracted. The situation as to Southern iron is not entirely clear. Business has been done at $10.50, Birmingham, for No. 2, and there are rumors of something lower by tired holders of warrants. That a considerable tonnage has been quietly closed is not unlikely and a large interest in the Chicago district is again indicated as a probable buyer. One Southern sale of 20,000 tons of pipe iron is reported. However, the general run of machinery foundries still hold off.

In the East the Pennsylvania Railroad's purchase of 4500 tons stands out. Connecticut malleable foundries are in the market and may take 15,000 to 20,000 tons. The low quotations that have lately come out in competing districts may lead to more blast furnaces stopping in eastern Pennsylvania.

A sale of 5000 tons of basic iron, delivery in June, has been made at $14.50 Valley furnace, and 10,000 tons each month may be taken by the same buyer for July and August. In eastern Pennsylvania basic iron has declined to $15.50 delivered.

The deadlock on furnace coke continues. Contracts have been made below the $2.50 basis for which makers are holding, and furnace companies, in the present condition of the pig iron market consider that price prohibitive. Early July will show whether coke sellers will yield or whether ovens will be blown out and prices held.

From foreign markets come pretty uniform reports of lower prices and slackening trade. Semi-finished steel is much weaker on Belgian and French selling. The Standard Oil Company is again inquiring for Welsh tin plates.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous.

	June 25, 1913.	June 18, 1913.	May 28, 1913.	June 26, 1912.
Pig Iron, Per Gross Ton:				
Foundry No. 2 X, Philadelphia	$16.00	$16.00	$16.50	$15.50
Foundry No. 2 Valley furnace.	14.00	14.00	14.50	13.25
Foundry No. 2 S'th'n, Cin'ti...	*13.75*	14.00	14.75	14.25
Foundry No. 2, Birmingham, Ala.	*10.50*	10.75	11.50	11.00
Foundry No. 2, furnace, Chicago*	*15.00*	15.50	16.00	14.50
Basic, delivered, eastern Pa....	*15.50*	15.75	16.50	15.25
Basic, Valley furnace.....	14.50	14.50	14.75	13.25
Bessemer, Pittsburgh	16.90	16.90	17.50	15.15
Malleable Bessemer, Chicago*..	*15.00*	15.50	16.00	14.50
Gray forge, Pittsburgh.....	14.65	14.65	14.90	13.90
Lake Superior charcoal, Chicago	*16.25*	16.75	18.00	16.25
Billets, etc., Per Gross Ton:				
Bessemer billets, Pittsburgh...	26.50	26.50	26.50	21.50
Open hearth billets, Pittsburgh	26.50	26.50	26.50	21.50
Open hearth sheet bars.....	27.00	27.00	27.00	22.00
Forging billets, Pittsburgh.....	34.00	34.00	34.00	28.00
Open hearth billets, Philadelphia	28.00	28.00	28.00	23.40
Wire rods, Pittsburgh.....	29.00	29.00	30.00	25.00
Old Material, Per Gross Ton:				
Iron rails, Chicago.....	14.00	14.00	15.75	16.00
Iron rails, Philadelphia.....	17.50	17.50	18.00	16.50
Carwheels, Chicago	13.50	13.50	14.25	14.00
Carwheels, Philadelphia	13.00	13.00	13.50	14.00
Heavy steel scrap, Pittsburgh..	12.50	12.50	13.00	13.50
Heavy steel scrap, Chicago.....	*10.50*	10.75	10.50	11.75
Heavy steel scrap, Philadelphia.	11.50	11.50	11.50	13.50
Finished Iron and Steel,				
Per Pound to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bessemer rails, heavy, at mill...	1.25	1.25	1.25	1.25
Iron bars, Philadelphia.....	*1.47½*	1.52½	1.57½	1.30
Iron bars, Pittsburgh.....	1.65	1.65	1.70	1.35
Iron bars, Chicago	1.50	1.50	1.57½	1.27½
Steel bars, Pittsburgh.....	1.40	1.40	1.40	1.20
Steel bars, New York.....	1.56	1.56	1.56	1.36
Tank plates, Pittsburgh	1.45	1.45	1.45	1.25
Tank plates, New York.....	1.61	1.61	1.61	1.41
Beams, Pittsburgh	1.45	1.45	1.45	1.25
Beams, New York	1.61	1.61	1.61	1.41
Angles, Pittsburgh	1.45	1.45	1.45	1.25
Angles, New York	1.61	1.61	1.61	1.41
Skelp, grooved steel, Pittsburgh	1.45	1.45	1.45	1.20
Skelp, sheared steel, Pittsburgh	1.50	1.50	1.50	1.25
Steel hoops, Pittsburgh	1.60	1.60	1.60	1.25
Sheets, Nails and Wire,				
Per Pound to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, Pittsburgh	2.25	2.25	2.30	1.90
Wire nails, Pittsburgh	1.80	1.80	1.80	1.60
Cut nails, f.o.b. Eastern mills...	1.80	1.80	1.80	1.60
Cut nails, Pittsburgh	1.70	1.70	1.70	1.55
Fence wire, ann'l'd, 0 to 9, Pgh.	1.60	1.60	1.60	1.40
Barb wire, galv., Pittsburgh....	2.20	2.20	2.20	1.90

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Coke, Connellsville, Per Net Ton, at Oven:

	June 25, 1913.	June 18, 1913.	May 28, 1913.	June 26, 1912.
Furnace coke, prompt shipment	*$2.10*	$2.15	$2.15	$2.10
Furnace coke, future delivery..	2.25	2.25	2.25	2.25
Foundry coke, prompt shipment	2.75	2.75	2.85	2.40
Foundry coke, future delivery..	3.00	3.00	3.00	2.50

Metals,

Per Pound to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York.....	*15.00*	15.50	15.75	17.75
Electrolytic copper, New York..	*14.50*	14.87½	15.65	17.62½
Spelter, St. Louis.....	4.95	4.95	5.25	6.95
Spelter, New York.....	5.10	5.10	5.40	7.10
Lead, St. Louis.....	**4.22½**	4.20	4.20	4.37½
Lead, New York.....	4.35	4.35	4.35	4.50
Tin, New York.....	*44.10*	44.75	48.75	48.15
Antimony, Hallett, New York..	8.15	8.15	8.20	7.75
Tin plate, 100-lb. box, Pittsburgh	$3.60	$3.60	$3.60	$3.40

Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Louis, 22½c.; Kansas City, 42½c.; Omaha, 42½c.; St. Paul, 32c.; Denver, 84½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets, Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.45c. to 1.50c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers, with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft., down to the weight of 3-16 in., take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras.	Cents per lb.
Gauges under ¼ in. to and including 3-16 in.....	.10
Gauges under 3-16 in. to and including No. 2.....	.15
Gauges under No. 8 to and including No. 9.....	.25
Gauges under No. 9 to and including No. 10.....	.30
Gauges under No. 10 to and including No. 12.....	.40
Sketches (including straight taper plates) 3 ft. and over	.10
Complete circles, 3 ft. in diameter and over.....	.20
Boiler and flange steel.....	.10
"A. B. M. A." and ordinary firebox steel.....	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive.....	.05
Widths over 110 in. up to 115 in., inclusive.....	.10
Widths over 115 in. up to 120 in., inclusive.....	.15
Widths over 120 in. up to 125 in., inclusive.....	.25
Widths over 125 in. up to 130 in., inclusive.....	.50
Widths over 130 in.	1.00
Cutting to lengths, under 3 ft., to 2 ft. inclusive....	.25
Cutting to lengths, under 2 ft., to 1 ft. inclusive....	.50
Cutting to lengths, under 1 ft.....	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, 3 in. and over, 1.45c. to 1.50c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.....	.10
H-beams over 18 in.....	.10
Angles over 6 in. on one or both legs.....	.10
Angles, 3 in. on one or both legs, less than ¼ in. thick, as per steel bar card, Sept. 1, 1909.....	.70
Tees, structural sizes (except elevator, hand rail, car-truck and conductor rail)	.05
Angles, channels and tees, under 3 in. wide as per steel bar card, Sept. 1, 1909.....	.20 to .80
Deck beams and bulb angles	.30
Hand rail tees	.75
Cutting to lengths, under 3 ft., to 2 ft. inclusive.....	.25
Cutting to lengths, under 2 ft., to 1 ft. inclusive.....	.50
Cutting to lengths, under 1 ft.....	1.55

No charge for cutting to lengths 3 ft. and over.

Wire Rods and Wire.—Bessemer, open-hearth and chain rods, $29. Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, $1.60; galvanized, $2. Galvanized barb wire, to jobbers, $2.20; painted, $1.80. Wire nails, to jobbers, $1.80.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12 & 12½	13	14	15	16
Annealed	...$1.75	$1.80	$1.85	$1.90	$2.00	$2.10	$2.20	$2.30
Galvanized	.. 2.15	2.20	2.25	2.30	2.40	2.50	2.90	3.00

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe (full weight) in effect from May 27, 1913, iron pipe (full weight), from June 2, 1913:

Butt Weld.

Steel. Inches.	Black.	Galv.	Iron. Inches.	Black.	Galv.
⅛, ¼ and ⅜.....	72	51½	⅛ and ¼.....	66	47
½	76	65½	⅜	65	46
¾ to 3	79	70½	½	69	56
			¾ to 2½.....	72	61

Lap Weld.

2	76	67½	1¼	56	45
2½ to 6.....	78	69½	1½	67	56
7 to 12.....	75	64½	2	68	58
13 to 15.....	52	..	2½ to 4	70	61
			4½ to 6	70	61
			7 to 12	68	55

Reamed and Drifted.

1 to 3, butt.....	77	68½	1 to 1¼, butt.....	70	59
2, lap	74	65½	2, butt	71	60
2½ to 4, lap.....	76	67½	1¼, lap	54	43
			1½, lap	65	54
			2, lap	66	56
			2½ to 4, lap.....	68	59

Butt Weld, extra strong, plain ends.

⅛, ¼ and ⅜.....	67	56½	⅜	63	52
½	72	65½	½	67	60
¾ to 1½.....	76	69½	¾ to 1½.....	71	62
2 to 3.....	77	70½	2 and 2½ 72		63

Lap Weld, extra strong, plain ends.

2	73	64½	1½	65	59
2½ to 4.....	75	66½	2.	66	58
4½ to 6.....	74	65½	2½ to 4	70	61
7 to 8.....	67	56½	4½ to 6	69	60
9 to 12.....	62	51½	7 and 8.....	63	53
			9 to 12	58	47

Butt Weld, double extra strong, plain ends.

½	62	55½	½	57	49
¾ to 1½.....	65	58½	¾ to 1½	60	52
2 to 2½.....	67	60½	2 and 2½	62	54

Lap Weld, double extra strong, plain ends.

2	63	56½	2	55	49
2½ to 4.....	65	58½	2½ to 4	60	54
4½ to 6.....	64	57½	4½ to 6	59	53
7 to 8.....	57	46½	7 to 8	52	42

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts to jobbers, in carloads on lap-welded steel, in effect from May 29, 1913, and standard charcoal-iron boiler tubes, in effect from January 1, 1913, are as follows:

Lap-Welded Steel.		*Standard Charcoal Iron.*	
1¼ and 2 in.....	60	1½ in.	44
2¼ in.	57	1¾ and 2 in.....	48
2½ and 2¾ in.....	63	2¼ in.	44
3 and 3¼ in.....	67	2½ to 2¾ in.....	53
3½ to 4½ in.....	69	3 and 3¼ in.....	55
5 and 6 in.....	63	3½ to 4½ in.....	58
7 to 13 in.....	60		

Locomotive and steamship special grades bring higher prices.

2½ in. and smaller, over 18 ft., 10 per cent. net extra.
2¾ in. and larger, over 22 ft., 10 per cent. net extra.

Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft. and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittburgh basing dicount, lowered by two points.

Sheets.—Makers' prices for mill shipments on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets.

Nos. 3 to 8.....	1.70
Nos. 9 and 10.....	1.75
Nos. 11 and 12.....	1.80
Nos. 13 and 14.....	1.85
Nos. 15 and 16.....	1.95

Box Annealed Sheets, Cold Rolled.

Nos. 10 and 11.....	1.90 to 2.00
No. 12	1.90 to 2.00
Nos. 13 and 14.....	1.95 to 2.05
Nos. 15 and 16.....	2.00 to 2.10
Nos. 17 to 21	2.05 to 2.15
Nos. 22 and 24	2.10 to 2.20
Nos. 25 and 26.....	2.15 to 2.25
No. 27	2.20 to 2.30
No. 28	2.25 to 2.35
No. 29	2.30 to 2.40
No. 30	2.40 to 2.50

Galvanized Sheets of Black Sheet Gauge.

Nos. 10 and 11.....	2.35 to 2.50
No. 12	2.45 to 2.60
Nos. 13 and 14.....	2.45 to 2.60
Nos. 15 and 16.....	2.60 to 2.75
Nos. 17 to 21.....	2.75 to 2.90
Nos. 22 and 24.....	2.90 to 3.05
Nos. 25 and 26.....	3.05 to 3.20
No. 27	3.20 to 3.35
No. 28	3.35 to 3.50
No. 29	3.50 to 3.65
No. 30	3.65 to 3.80

Pittsburgh

PITTSBURGH, PA., June 24, 1913.

On some lines of finished material, such as plates, steel bars and steel pipe, local mills report that actual orders entered so far this month are heavier than in the same time in May, and this is about the most encouraging information that can be given out about the iron trade this week. A general estimate places specifications as running from 60 to 70 per cent. of the output of the mills, but on a few lines the rate is higher. The unfavorable feature just now is that owing to severe financial conditions railroads are buying little material of any kind. The president of a leading railroad has stated that his road was badly in need of a large amount of equipment, but was so poor that it could not place any orders, and said that many other railroads were in the same condition. The steel mills in this district are still running to full capacity, making record outputs, and expect to keep it up for the next three months at least. The Carnegie Steel Company is turning away business every day, not being able to make the deliveries wanted. It has specifications taking practically its entire output on everything until late in the year, and has passed actual orders for rolling for all the material it can make up to October. Other leading steel concerns are nearly as well off and are not making active effort to secure new business, nor on the other hand is there any disposition on the part of buyers to contract ahead. There is still weakness in prices of sheets and wire products, very little new business being placed. The scrap trade is in the worst condition it has been in many years, but better things are looked for after July 1, when it is expected a buying movement will develop.

Pig Iron.—Owing to delay in getting its two new blast furnaces finished and in operation the Pittsburgh Steel Company has been compelled to come in the market and buy considerable basic iron. It has already bought 5000 tons from a local interest for June delivery, and has inquiries out for 10,000 tons a month for July and August shipment. The price paid for the June basic iron is given as $14.50 at maker's furnace. The Union Steel Casting Company has bought 200 tons of prompt Bessemer iron from an outside furnace at a delivered price equal to slightly under $16 at Valley furnace. There is a fair amount of inquiry for foundry iron and we note sales of 2000 to 2500 tons of No. 2 at $14.25 at Valley furnace. When the Westinghouse Electric & Mfg. Company bought its 15,000 tons of foundry iron about three weeks ago at least part of it went as low as $13.75 at Valley furnace. Later other consumers tried to buy at this price, but could not find any furnaces that would sell more No. 2 at less than $14 at furnace. The Union Radiator Company, Johnstown, Pa., has bought 2500 to 3000 tons of foundry iron for delivery over third quarter on the basis of about $14 at Valley furnace. We quote Bessemer iron at $16; basic, $14.50; malleable Bessemer, $14.25 to $14.50; No. 2 foundry, $14 to $14.25, and gray forge, $13.75, all at Valley furnace, the freight rate to the Pittsburgh district being 90c. a ton.

Billets and Sheet Bars.—Several large consumers that buy billets and sheet bars on sliding scale contracts have been notified by the seller that the price on Bessemer and open-hearth billets for third-quarter delivery will be $26.50 and on Bessemer sheet bars $27.50 f.o.b. Pittsburgh or Youngstown mill. No objection has been heard as yet from these concerns, and it is believed they will accept the prices named. There is considerable inquiry for sheet bars for third-quarter delivery. The Carnegie Steel Company is being importuned to sell open-hearth sheet bars to sheet and tin plate mills for third-quarter delivery, but has replied that it has none to spare. We note a sale of 1000 tons of open-hearth sheet bars for August and September shipment at $27.50 at maker's mill, Youngstown. The three leading makers of billets and sheet bars that sell in the open market, these being Carnegie, Republic and Youngstown Sheet, are firm in their ideas as to prices for third-quarter delivery. We quote Bessemer and open-hearth billets for prompt and third-quarter delivery at $26.50 to $27 and Bessemer and open-hearth sheet bars for same deliveries at $27 to $27.50, maker's mill, Pittsburgh or Youngstown. We quote forging billets at $34 to $35 and axle billets $29 to $30.

Ferroalloys.—The local market is very dull, only an occasional inquiry coming out for carload lots for prompt delivery, and which are sold at $59 to $59.50 Baltimore. The official price on ferromanganese for delivery over last half of the year is $61, Baltimore, but it has been offered at a lower figure. Consumers are covered on their needs over last half and there is no new inquiry. We quote 80 per cent. English ferromanganese at $60 to $60.50, Baltimore, the freight rate to the Pittsburgh district being $2.16 per ton. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at $75; over 100 tons to 600 tons, $74; over 600 tons, $73, Pittsburgh.

Wire Rods.—Makers report specifications against contract coming in at a fairly satisfactory rate, but little new inquiry. We quote Bessemer, open hearth and chain rods at $29, Pittsburgh.

Muck Bar.—There is a great scarcity of puddlers in the Pittsburgh, Wheeling and Youngstown districts, and mills that make muck bar cannot obtain enough men to run their plants full. The higher wage rate on puddling is also having the effect of strengthening the muck bar market. We quote best grades of muck bar, made from all pig iron, at $31 delivered at buyer's mill in the Pittsburgh district.

Skelp.—There is a fair amount of new demand, and local skelp mills are pretty well filled for some time ahead. Prices on the wider sizes of sheared iron skelp are slightly lower. We quote: Grooved steel skelp, 1.45c. to 1.50c.; sheared steel skelp, 1.50c. to 1.55c.; grooved iron skelp, 1.70c. to 1.75c.; sheared iron skelp, 1.75c. to 1.80c.; all delivered to buyers' mills in the Pittsburgh district.

Steel Rails.—The Southern Railway has an inquiry out for 28,000 tons of rails for last half delivery, either Bessemer or open hearth. If the road decides to buy open-hearth rails, the order will likely go to the Tennessee Company, but if it buys Bessemer the order may go to the Maryland Steel Company. One large company states that specifications against contracts for rails are coming in quite freely, and it is filled ahead with actual business for 60 to 90 days. This company booked an order last week for 1300 tons of light rails from a leading Eastern mine and received orders and specifications last week for 3300 tons of light rails, the order for 1300 tons not being included in this total. A good part of the business being placed in light rails is going to the rerolling rail mills, who are underselling prices on light rails rolled from billets from $1 to $2 a ton. We quote splice bars at 1.50c. per lb. and standard section rails at 1.25c. per lb. Light rails are quoted as follows: 25, 30, 35, 40 and 45 lb. sections, 1.25c.; 16 and 20 lb., 1.30c.; 12 and 14 lb., 1.35c., and 8 and 10 lb., 1.40c., all in carload lots, f.o.b. Pittsburgh.

Plates.—New inquiries include about 200 tons of sheared plates for a water line for Akron, Ohio, and about 3700 tons for a water works job at Hartford, Conn. The Chesapeake & Ohio Railroad has placed 1000 steel gondolas with the Ralston Steel Car Company at Columbus, Ohio, and is asking prices on 1000 more. The Southern Railway has placed 400 steel hopper cars with the Pressed Steel Car Company, for which the plates and shapes, about 5000 tons, will be rolled by the Carnegie Steel Company. New inquiry for plates is fairly active, and the two leading local mills report they have actual orders on their books to take their entire output up to October. Some of the smaller mills can make deliveries two or three weeks from date of order, and they are getting most of the new business. We quote ¼-in. and heavier tank plate at 1.50c. to 1.60c. for delivery in three to four weeks, while for forward delivery 1.45c. at maker's mill is still being quoted.

Structural Material.—New inquiry is reported fairly good, but only a moderate amount of work is being placed. The McClintic-Marshall Construction Company has taken about 3000 tons of miscellaneous work and the American Bridge Company has taken 1100 tons for a viaduct for an Eastern road. Local fabricators report they are pretty well filled to October or later and are refusing to meet some of the low prices being named by their competitors. We quote beams and channels up to 15 in. at 1.45c. to 1.50c. Small lots from warehouse for prompt delivery are bringing from 1.60c. up, depending on the size of the order and the deliveries wanted.

Iron and Steel Bars.—New orders for steel bars and specifications so far this month have been heavier than in the same period in May. A leading local maker reports that its specifications for steel bars in May just about equaled its output, but June specifications will considerably exceed the output. Local bar mills are pretty well filled up on actual orders to October, and some contracts have been closed the past week for delivery over last half of the year at the full price of 1.40c. at maker's mill. The new demand for iron bars has quieted down and mills are able to make more prompt deliveries. The new demand for steel bars

for reinforcing purposes continues heavy, and this year will be a record breaker in this product. For forward delivery steel bars are firm at 1.40c. at mill, but for shipment in three to four weeks prices from warehouse and other sources of supply are slightly lower than they have been. We quote iron bars at 1.65c. to 1.70c. for delivery in six to eight weeks. The mills continue to charge $1 extra per ton for twisting ¾-in. and larger steel bars and $2 extra for ½ to ⅝ in.

Sheets.—While some makers are naming 2.25c. on No. 28 Bessemer black sheets, the American Sheet & Tin Plate Company and several others are reported as holding firm at 2.35c. Reports that some contracts for black and galvanized sheets made some time ago have been readjusted to lower prices are absolutely denied. The new demand is quiet, but there is a heavy inquiry for both black and galvanized sheets, and a good buying movement is looked for in the near future. The Apollo Steel Company, Apollo, Pa., is a new producer of black and galvanized sheets in this market, having successfully started its mills about two weeks ago. One leading mill reports that on black sheets it is filled up for 12 weeks, on galvanized about 16 weeks and on blue annealed sheets about 22 weeks. This week the American Sheet & Tin Plate Company is operating to about 78 per cent. of its hot sheet mill capacity, still being short of steel. Prices on blue annealed sheets are very firm. We quote No. 10 blue annealed sheets at 1.75c.; No. 28 Bessemer black sheets, 2.25c. to 2.35c.; No. 28 galvanized at 3.35c. to 3.50c., and No. 28 tin mill black plate at 2.30c. These prices are f.o.b. Pittsburgh, in carload and larger lots, jobbers charging the usual advances for small lots from store.

Tin Plate.—Specifications against contracts have shown slight betterment this month, but are still unsatisfactory. The settlement of wage scales by the mills that run union means that there will be no shutdown July 1 on account of labor troubles, but it is possible there will have to be a slowing up in operations with some that are running short of specifications. The American Sheet & Tin Plate Company is operating this week to about 87 per cent. of its hot tin mill capacity and has actual specifications on hand to take its entire output to October or later. Not enough new business is being placed in tin plate to test prices, which are only fairly strong. We quote 100-lb. cokes at $3.60 and 100-lb. ternes at $3.45, f.o.b. Pittsburgh.

Bolts and Rivets.—The irregularity in prices of rivets which has existed for some time has resulted in a reduction of $4 a ton from what have been regarded as official prices, these having been $2.20 for button-head structural rivets and $2.30 per 100 lb. for cone-head boiler rivets. We now quote button-head structural rivets at $2 and cone-head boiler rivets at $2.10 in carload lots, while for small lots, consisting of a ton or more, button-head structural rivets are $2.10 and cone-head boiler rivets $2.20. New terms of payment have been put in force, namely, 30 days net, less 2 per cent. for cash in 10 days. Many contracts for rivets expire July 1, and there is considerable inquiry from consumers for their wants for second half of the year, and the makers look for large buying early in July. The new demand for bolts is only fair, representing not over 75 per cent. of capacity, while specifications against contracts are much lighter than for some time. Regular discounts on bolts, which, however, are not firmly held, are as follows, in lots of 300 lb. or over delivered within a 20c. freight radius of maker's works:

Coach and lag screws	80 and 10% off
Small carriage bolts, cut threads	75 and 5% off
Small carriage bolts, rolled threads	75 and 10% off
Large carriage bolts	70 and 2½% off
Small machine bolts, cut threads	75 and 10% off
Small machine bolts, rolled threads	75, 10 and 5% off
Large machine bolts	70 and 7½% off
Machine bolts with C.P.C. and T nuts, small	75 and 5% off
Machine bolts with C.P.C. and T nuts, large	70% off
Square hot pressed nuts, blanked and tapped	$5.70 off list
Hexagon nuts	$6.30 off list
C.F.C. and R. square nuts, tapped and blank	$5.70 off list
Hexagon nuts, ½ and larger	$6.60 off list
Hexagon nuts smaller than 9/16	$7.20 off list
C.P. plain square nuts	$5.20 off list
C.P. plain hexagon nuts	$5.50 off list
Semi-finished hexagon nuts ½ and larger	85% off
Semi-finished hex. nuts smaller than 9/16	85 and 10% off
Rivets, 7/16 x 6½, smaller and shorter	75, 10 and 10% off
Rivets, metallic tinned, bulk	3½c. per lb. net extra
Rivets, tin plated, bulk	1½c. per lb. net extra
Rivets, metallic tinned, packages	70, 10 and 10% off
Standard cap screws	75, 10, 10 and 7½% off
Standard set screws	75, 10, 10 and 7½% off

Railroad Spikes.—Some of the railroads have not covered on their requirements of spikes for last half of the year, and there are inquiries for that delivery. Specifications against contracts are only fair. Low prices continue to be made in Western markets on spikes, notably in St. Louis and Chicago. There is now little trouble in getting prompt deliveries, the makers having pretty well caught up on orders. We quote railroad spikes in base sizes, 5½ x 9/16 in., at $1.75 to $1.80, and small railroad and boat spikes in carload and larger lots at $1.80 to $1.85 per 100 lb., f.o.b. Pittsburgh.

Shafting.—The demand is very dull, and specifications against contracts are light. Some consumers have not covered their wants for the last half, but are very slow in making contracts on account of the uncertain outlook for the near future. We quote cold-rolled shafting at 60 per cent. off in carload and larger lots, and 55 per cent. off in small lots delivered in base territory. On a very desirable specification and for large tonnage the lower price might be slightly shaded.

Hoops and Bands.—Mills report the new demand only fair, with specifications against contracts coming in at a moderate rate. Some new tonnage has been placed this month by consumers for delivery over last half of the year in both hoops and bands. We quote hoops at 1.60c. and bands at 1.40c., f.o.b. Pittsburgh, with extras on the latter as per the steel-bar card.

Wire Products.—Makers report a reasonably good demand for wire and wire nails, and specifications are being received in moderate volume. It is evident, however, that owing to the weakness in prices jobbers and consumers do not intend to carry any larger stocks of nails or wire than are needed to meet actual wants. The wire trade in July and August is expected to be dull. It is stated that few nails have been sold at $1.80, most of the new business being taken at $1.75 by the mills. What are regarded as official prices, but which are shaded about $1 a ton or more, are as follows: Wire nails, $1.80, base, per keg; cut nails, $1.70 to $1.75; galvanized barb wire, $2.20 per 100 lb.; painted, $1.80; annealed fence wire, $1.60, and galvanized fence wire, $2, f.o.b. Pittsburgh, usual terms, freight added to point of delivery. Jobbers charge the usual advances over these prices for small lots from store.

Merchant Steel.—The new demand is dull, but specifications are moderately good. A number of structural concerns overspecified this quarter on their contracts and are now sending in specifications for material that ordinarily was not to be delivered until third quarter. The mills report they have contracts on their books through third quarter and actual specifications for 45 to 60 days ahead. We quote: Iron finished tire, 1½ x 1½ in. and larger, 1.40c., base; under 1½ x ½ in., 1.55c.; planished tire, 1.60c.; channel tire, ¾ to ⅞ and 1 in., 1.90c. to 2c.; 1⅛ in. and larger, 2c.; toe calk, 2c. to 2.10c., base; flat sleigh shoe, 1.75c.; concave and convex, 1.80c.; cutter shoe, tapered or bent, 2.30c. to 2.40c.; spring steel, 2c. to 2.10c.; machinery steel, smooth finish, 1.85c. We quote cold-rolled strip steel as follows: Base rates for 1 in. and 1½ in. and wider, under 0.20 carbon, and No. 10 and heavier, hard temper, 3.30c.; soft, 3.55c.; coils, hard, 3.20c.; soft, 3.45c.; freight allowed. The usual differentials apply for lighter gauges and sizes.

Standard Pipe.—Three or four good-sized projects for oil and gas lines are being held up until the matter of franchise has been definitely settled. One of these, involving a large amount of pipe, may go through in the next week or so. Current orders from the trade for standard pipe are heavy, and actual business booked by the mills so far this month shows a good increase over the same period in May. The demand for oil-country goods is enormously heavy, and the mills state they are getting further back in deliveries. Discounts on iron and steel pipe are fairly well maintained.

Boiler Tubes.—The mills are overwhelmed with business, and several state that if they could make the deliveries wanted they could get almost any price. Leading mills are so far back in deliveries that in a few cases they have advised customers to place orders elsewhere. The demand for seamless steel tubing is heavy, and this year will be a record breaker. One leading maker states it has practically its entire product sold up for all of this year and another to October. Discounts on both iron and steel tubes are said to be firmly held.

Old Material.—Dealers state that present conditions in the scrap trade could hardly be worse, and in view of this they think any change in the situation must necessarily be for the better. Nearly all large consumers are holding up shipments, not caring to take in anything prior to July 1, and there is still an embargo on for the Jones & Laughlin mills. Dealers state it is useless to try to do business under present conditions, and they are simply waiting until the demand improves, but at the same time are not willing to sell short, as they feel a turn for the better in prices is near at hand.

We note sales of about 1200 to 1500 tons of turnings at $6.75, delivered at buyer's mill in the Pittsburgh district; 1000 tons of ordinary steel scrap at $12.50 delivered, and about 1400 tons of carwheels at about $13.75 delivered. Dealers quote as follows, per gross ton, for delivery in the Pittsburgh district:

Selected heavy steel scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen and Pittsburgh delivery	$13.00 to $13.50
Ordinary steel scrap	12.50 to 12.75
No. 1 foundry cast	12.75 to 13.00
No. 2 foundry cast	11.50 to 11.75
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	8.50 to 8.75
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	14.50 to 14.75
No. 1 railroad malleable stock	11.50 to 11.75
Grate bars	8.25 to 8.50
Low phosphorus melting stock	15.50 to 15.75
Iron car axles	24.50 to 25.00
Steel car axles	17.50 to 17.75
Locomotive axles, steel	21.00 to 21.50
Locomotive axles, iron	25.50 to 26.00
No. 1 busheling scrap*	12.00 to 12.25
No. 2 busheling scrap	7.50 to 7.75
Old carwheels	13.75 to 14.00
*Machine shop turnings	6.50 to 6.75
*Cast-iron borings	8.25 to 8.50
†Sheet bar crop ends	14.00 to 14.25
Old iron rails	14.50 to 14.75
No. 1 railroad wrought scrap	13.75 to 14.00
Heavy steel axle turnings	9.00 to 9.25
Stove plate	8.25 to 8.50

*These prices are f.o.b. cars at consumers' mills in the Pittsburgh district.
†Shipping point.

Coke.—Trade is practically at a standstill, producers and consumers still being wide apart as to prices on furnace coke for second half. The Producers Coke Company, Uniontown, Pa., and other leading makers have been holding firmly for last half at $2.50 per net ton at oven, but no business has been closed. Some talk is heard that unless the furnaces that have not covered for last half soon place contracts the operators will close down a number of ovens to keep down production and prevent any surplus. Inquiries that have been in the market for three or four weeks from the Wisconsin Steel Company, Wickwire Steel Company, Inland Steel Company and New Jersey Zinc Company do not seem any nearer being closed than when they first came out. There is little demand for furnace coke for prompt shipment, as consumers seem to be well covered. Some fairly large contracts for standard 72-hr. foundry coke have lately been placed at about $3 per net ton at oven, and the market seems strong at this price. We quote standard makes of Connellsville furnace coke for prompt delivery at $2.10 to $2.15 per net ton at oven, and on contracts for last half at $2.25 to $2.50. We quote 72-hr. foundry at $2.75 to $2.85 for prompt delivery and $2.90 to $3 per net ton at oven for second half. The Connellsville Courier reports the output in the Upper and Lower Connellsville regions last week as 410,608 tons, an increase over the previous week of 1000 tons.

Chicago

CHICAGO, ILL., June 25, 1913.—(*By Telegraph.*)

Considerable satisfaction may be obtained from the fact that some new tonnage of importance is being placed from day to day in spite of the acknowledged intent of consumers to avoid all buying that is not absolutely necessary. Bookings of shapes, bars, sheets and miscellaneous finished steel tonnage are reported as heavier the past week than at any time in the preceding 60 days. But the attitude of the largest buyers of implement bars, who are still delaying the placing of their contracts, is typical generally of the buyer's position. Curtailment of orders from the railroads is marked and general and if continued will contribute rapidly to the improvement in mill deliveries. The reports of inquiry for 1914 rails do not appear to be supported by any further activity in that direction. Interesting by considerable is the record of sustained buying of steel from jobbers' stocks. With the exception of plates, steel out of store has been sufficiently active to promise for June a record-breaking tonnage. Aside from the quite general disappearance of premium prices, no additional weakness has appeared in mill prices. More activity is noted in pig iron, with here and there a sale of considerable size; but buying remains so scattered that no impetus is furnished toward a reaction favoring selling interests. Buying of scrap for consumption is at a standstill. While the offerings of the week total over 20,000 tons, trade is so desultory as to make the future of the market wholly problematical.

Pig Iron.—The local market shows sporadic buying. That it is distinctly harrassing to the furnace interests is obvious from the fact that each week one or two large melters cover for a considerable portion of their requirements. Other foundries, buying from hand to mouth, seem well satisfied with their stocks on hand and steadily the price of iron declines. One Southern interest has just completed a sales campaign in which a very considerable total was disposed of in various territories at a price reported to be $11, Birmingham, although this appears to be above the present market level. A Wisconsin malleable foundry was in the market for 4000 tons, and is understood to have closed for all of it. A northern Indiana plow manufacturer has been feeling out the market with inquiries running into heavy tonnages and has purchased some iron. Inquiries are numerous for lots of widely varying size, including also an active interest in charcoal iron, with some buying. Prices are decidedly ragged. It is conceded that the average buyer would not be required to pay $11, Birmingham, for Southern iron, nor over $15.50 at furnace for local iron. Indications are that some of the attractive business of the past week was placed at as low a figure as $15 at Chicago district furnace. Charcoal iron has been quoted at less than $16.50, delivered Chicago. The anomaly in the situation is the free contracting for coke, sales of which run into as large tonnages as a year ago and larger. The Pennsylvania Steel Company sold 500 tons of low phosphorus iron. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a local switching charge averaging 50c. a ton:

Lake Superior charcoal, Nos. 1, 2, 3, 4	$16.25 to $17.25
Northern coke foundry, No. 1	15.50 to 16.00
Northern coke foundry, No. 2	15.00 to 15.50
Northern coke foundry, No. 3	14.50 to 15.00
Southern coke, No. 1 foundry and No. 1 soft	15.35 to 15.85
Southern coke, No. 2 foundry and No. 2 soft	14.85 to 15.35
Southern coke, No. 3	14.35 to 14.85
Southern coke, No. 4	13.85 to 14.35
Southern gray forge	13.85 to 14.35
Southern mottled	13.85 to 14.35
Malleable Bessemer	15.00 to 15.50
Standard Bessemed	18.40
Basic	15.50 to 16.00
Jackson Co. and Kentucky silvery, 6 per cent	20.40
Jackson Co. and Kentucky silvery, 8 per cent	21.40
Jackson Co. and Kentucky silvery, 10 per cent	22.40

(By Mail)

Rails and Track Supplies.—Less credence is being given to the reports of inquiry for 1914 rails by some of the Western railroads, especially where the reports concern railroads accustomed to postpone their buying until the end of the year. The week brought out some buying of track fastenings and also the placing of a fair tonnage of axles, but for the most part both new orders and contract specifications from the railroads are confined to compulsory purchasing. Sales of about 4000 tons of rails are reported. We quote standard railroad spikes at 1.80c., base; track bolts with square nuts, 2.30c. to 2.40c., base, all in carload lots, Chicago; tie plates, $33 to $35 net ton; standard section Bessemer rails, Chicago, 1.25c., base; open-hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

Structural Material.—The outlook has been brighter the past fortnight and appearances have been borne out by an improvement in the number and volume of inquiries and orders. A liquidation of stocks by fabricators has been responsible in part for this better situation. With the exception of the placing of the 7396 tons of steel for the City Hall at San Francisco with the American Bridge Company, contracts for fabricated steel reported last week were of little consequence. The Davenport Machine & Foundry Company will furnish 113 tons for the T. J. Walsh building at Davenport, the Indiana Bridge Company will fabricate 112 tons for a power station addition at Fort Wayne for the Fort Wayne & Northern Indiana Traction Company, and the Chicago Bridge & Iron Company will supply 239 tons of steel for three Chicago river bridges. Mill deliveries of structural shapes are steadily improving and for reasonably prompt shipment we quote, Chicago, delivery, 1.63c.

The improvement noted a week ago in the demand for structural shapes from store has been enhanced the past week, due in large measure to local building activities. Labor difficulties involving the local building trades may reduce this tonnage. For delivery from store we continue to quote 2.05c.

Plates.—A few inquiries for cars are noted, including 500 box cars, 200 gondolas and 200 miscellaneous freight cars for the El Paso & Southwestern Railroad

and about 150 flat cars and gondolas for the Grand Rapids & Indiana. We quote for Chicago delivery, from mill, 1.63c., although some plate business in small lots for prompt shipment is reported on the basis of 1.50c., Pittsburgh. This is exceptional as premiums have practically disappeared.

In the store trade plates show less activity than any other of the finished steel lines. We continue to quote 2.05c.

Sheets.—Although new business is quiet in sheets, as in other steel products, carload orders are being placed with more or less regularity. An unwillingness to buy is reflected, however, in the attitude of most purchasers and their transactions represent mandatory requirements. Prices of both black and galvanized sheets continue irregular, more especially on the latter. Local mill deliveries vary from two to three weeks for galvanized to six and eight weeks on black. We quote for Chicago delivery in carloads from mill: No. 28 black sheets, 2.48c. to 2.53c.; No. 28 galvanized, 3.53c. to 3.58c.; No. 10 blue annealed, 1.93c.

Sheet tonnage out of warehouse has held up surprisingly well, in view of the improvement in mill deliveries and the prevailing weakness in mill prices. Such pressure upon store prices of sheets as has appeared has not been sufficient to occasion any marked departure from full quotations, but an official recognition by the mills of lower prices would undoubtedly be followed by an adjustment in prices out of store. We quote store prices without change as follows: No. 10 blue annealed, 2.25c.; No. 28 black, 2.90c.; No. 28 galvanized, 4.15c.

Bars.—Following the brief period of active selling of bar iron by one of the local mills reported a week ago, this market resumed its general apathetic status, with little inquiry coming out and few orders. New business is being taken on the basis of 1.50c., but the mills with considerable business on their books are holding to 1.55c. and are booking specifications on that basis. Some of the largest buyers of steel bars in this territory are still delaying the placing of their contracts, using up such stocks as they have and buying in small lots for immediate needs. The active demand for reinforcing bars continues. Prices are firm. We quote for mill shipment as follows: Bar iron, 1.50c. to 1.55c.; soft steel bars, 1.58c.; hard steel bars, 1.60c.; shafting in carloads, 58 per cent. off; less than carloads, 53 per cent. off.

The buying of bars from local warehouses continues without marked recessions in tonnage, though well within the handling capacities of the jobbers. For delivery from store, we quote soft steel bars, 1.95c.; bar iron, 1.95c.; reinforcing bars, 1.95c. base with 5c. extra for twisting in sizes ¾ in. and over, and usual card extras for smaller sizes; shafting 53 per cent. off.

Rivets and Bolts.—The situation here with respect to rivets and bolts alike is without feature. There is little business offering and prices are entirely without strength. We quote from mill as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 75-10; cut thread, 75-5; larger sizes, 70-2½; machine bolts up to ⅜ x 4 in., rolled thread, 70-10-5; cut thread, 75-10; large size, 70-7½; coach screws, 80-10; hot pressed nuts, square head, $5.70 off per cwt.; hexagon, $6.30 off per cwt. Structural rivets, ¾ to 1¼ in., 2.08c., base, Chicago, in carload lots; boiler rivets, 0.10c. additional.

Out of store we quote for structural rivets, 2.70c., and for boiler rivets, 2.90c. Machine bolts up to ⅜ x 4 in., 70-7½; larger sizes, 65-5, carriage bolts up to ⅜ x 6 in., 70-5; larger sizes, 65 off Hot pressed nuts, square head, $5.30, and hexagon, $5.90 off per cwt.

Wire Products.—The general movement of wire products is seasonably light, with special and plain wire for manufacturing purposes the most active of the various lines. Of the business that is being placed little is being booked on the basis of the last advance in price, although it continues to be the nominal market. Within the next few weeks a number of the wire mills are expected to be shut down for the customary midsummer repairs. We quote as follows to jobbers: Plain wire, No. 9 and coarser, base, $1.78; wire nails, $1.98; painted barb wire, $1.98; galvanized, $2.38; polished staples, $1.98; galvanized, $2.33, all Chicago.

Cast-Iron Pipe.—The financial situation continues to exert a depressing influence on the possibilities for new cast-iron pipe business. Pipe foundries are particularly lacking in orders for the larger sizes of pipes which run into tonnage. In the smaller sizes sufficient business has been secured to create a degree of firmness in the price of those sizes. New business includes a letting of 2500 tons at Springfield, Ohio, and 2000 tons of 42-in. and 48-in. pipe at Cincinnati, Ohio. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $28.50; 6 to 12 in., $26.50; 16 in. and up, $25.50, with $1 extra for gas pipe.

Old Material.—Buying of scrap by local consumers is so light as to be without influence on the market. The filling of short orders by dealers is likewise desultory. It is thus difficult to approximate from such prices as are now being made what the various grades would command if any substantial buying movement should be inaugurated. The prevailing influences at present are almost entirely depressing. Railroad lists closing during the present week offer about 20,000 tons of scrap to be absorbed, while the mills, on the other hand, in anticipation of the customary shutdown of one or two weeks in July, are disposed to take in as little as possible. Investigation of recent transactions show some isolated instances of very low prices, lower by quite a margin than it has been possible apparently to force down the general market for the purpose of filling old orders taken at higher prices. The general level of the market is, however, slightly lower. The railroad offerings include about 10,000 tons by the Illinois Central, 3500 tons by the Michigan Central, 2800 tons by the Chicago, Burlington & Quincy, 2000 tons by the Chicago, Milwaukee & St. Paul, 1800 tons by the Rock Island and 600 tons by the Chicago & Eastern Illinois. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton.

Old iron rails	$14.00 to $14.50
Old steel rails, rerolling	12.50 to 12.75
Old steel rails, less than 3 ft.	11.25 to 11.75
Relaying rails, standard section, subject to inspection	24.00
Old carwheels	13.50 to 14.00
Heavy melting steel scrap	10.50 to 11.00
Frogs, switches and guards, cut apart	10.50 to 11.00
Shoveling steel	10.00 to 10.50
Steel axle turnings	7.50 to 8.00

Per Net Ton.

Iron angles and splice bars	$13.75 to $14.25
Iron arch bars and transoms	14.00 to 14.50
Steel angle bars	10.00 to 10.25
Iron car axles	19.25 to 19.75
Steel car axles	16.75 to 17.25
No. 1 railroad wrought	10.50 to 10.75
No. 2 railroad wrought	9.75 to 10.25
Cut forge	9.75 to 10.25
Steel knuckles and couplers	10.75 to 10.25
Steel springs	11.00 to 11.50
Locomotive tires, smooth	11.75 to 12.25
Machine shop turnings	5.00 to 5.50
Cast and mixed borings	4.75 to 5.25
No. 1 busheling	8.50 to 9.00
No. 2 busheling	6.50 to 7.00
No. 1 boilers, cut to sheets and rings	7.25 to 7.75
Boiler punchings	11.75 to 12.25
No. 1 cast scrap	10.25 to 10.75
Stove plate and light cast scrap	8.75 to 9.25
Railroad malleable	10.75 to 11.25
Agricultural malleable	9.75 to 10.25
Pipes and flues	7.25 to 7.75

Philadelphia

PHILADELPHIA, PA., June 24, 1913.

Sellers find it difficult to close important transactions in the face of uncertainties now confronting the trade, in which further reductions in tariff rates, as proposed by the Senate Finance Committee, are the prominent influence. A larger volume of business has been moving in pig iron. Foundry iron prices continue weak. Plates are a trifle more active, some orders for boat plates having been placed. A better tonnage of structural material is ahead. Small orders for steel rails have been placed with some of the Eastern mills. Iron bars are quiet, with prices easy, but negotiations for steel bars are more active. The deadlock on coke prices continues. Old material is comparatively quiet, both buyers and sellers awaiting developments.

Iron Ore.—Business in both foreign and domestic ore is practically at a standstill. Importations at this port the past week include 12,400 tons from Newfoundland, 5944 tons from Spain, 5750 tons from Cuba and 9600 tons from New Brunswick.

Pig Iron.—Sales of several round lots of foundry iron, together with current small orders, have brought the week's sales to a very fair volume. The principal transaction was that closed by the Pennsylvania Railroad for 4500 tons, the minimum of its recent inquiry, comprising 1100 tons of charcoal and 3400 tons of coke foundry, for third quarter, the latter class of iron going to producers in the central part of the State. A Delaware River cast-iron pipe maker purchased something over 1000 tons of low grade iron, while other smaller sales are noted. Low grade iron, delivered at Delaware River points, is quotable at about $15. In the higher grades of foundry iron most consumers continue to follow conservative lines. Where it has been customary to make purchases of 500 to 1000 tons, for forward delivery, buyers are placing week to week orders for 50 and 100 tons, taking advantage of any recession

in prices. That consumers are not well supplied with iron is evidenced by continued buying of this character and the frequent insistence that delivery must be promptly made. The Baldwin Locomotive Works is out to-day with an inquiry for 2000 to 4000 tons of floor grade foundry for August-September delivery. Standard brands of eastern Pennsylvania No. 2 X are quotable at $16 to $16.50 delivered, but can hardly be said to be firm, as some makers are determined to meet competition rather than have regular customers place business elsewhere. Rumors that $15.75 delivered has been done for standard No. 2 X foundry are heard, but lack confirmation. Virginia producers, whose prices for some time have been out of line, while quoting and making sales at $13.75 at furnace, for No. 2 X, are not holding firmly and there is no doubt that $13.50 could be done, which would bring the minimum price to $16.30 delivered in this vicinity. The movement of Southern iron in this district has been less pronounced. Rolling mill forge iron remains inactive and is nominally quoted at $15.25 delivered in this district. A fair movement in low phosphorus pig iron has developed; one sale of 1200 tons of standard analysis iron was made at $23.50 for nearby delivery, with smaller sales on the same basis. A little more interest has been shown in basic iron but no business has been done. One melter offered $15.50 for a moderate lot, but sellers hold at $16 delivered for small lots and $15.75 could be done on heavier business. No large lot buyers in this district are, however, in the immediate market in this vicinity. Prices generally still show irregularity. Freight rates are becoming more of a factor in the basing of competitive prices, but for ordinary business the following range about represents the market for standard brands, delivered in buyers' yards in this vicinity:

Eastern Pennsylvania No. 2 X foundry	$16.00 to $16.50
Eastern Pennsylvania No. 2 plain	15.75 to 16.00
Virginia No. 2 X foundry	16.30 to 16.75
Virginia No. 2 plain	16.05 to 16.50
Gray forge	15.25
Basic	15.50 to 16.00
Standard low phosphorus	23.50

Ferroalloys.—There has been practically no demand for either prompt or forward 80 per cent. ferromanganese. The proposed change in the tariff rates, placing this material on the free list, no doubt has had some bearing on the situation. Quotations are nominally $61, seaboard, for either prompt or forward delivery. Ferrosilicon is quiet, with prices unchanged.

Billets.—A smaller volume of new business is coming to Eastern mills, but specifications on old orders are heavy and keep mills occupied at full capacity. They are well sold up for the third quarter. While basic open hearth rolling billets are quoted at $28, delivered here, on ordinary business, large lots could be had at somewhat lower prices. Forging billets are comparatively firm at $34 minimum at Eastern mill, for ordinary analysis specifications.

Plates.—Eastern mills continue to receive a very good volume of business, the past week exceeding the previous one. Contracts up to 1000 tons are being entered for third and fourth quarters at 1.75c., which price is being maintained for the general run of business by practically all producers, although Western plates for early forward delivery are available at 1.65c., delivered here. Considerable business has been placed in ship plates, while one inquiry for several thousand tons is before the trade. An inquiry for several thousand tons for gas holders is also being figured on. Mill capacities continue fully taken, although deliveries on some classes of plates can be had in two to three weeks.

Structural Material.—While there has been no increase in the volume of miscellaneous business coming to Eastern mills, the outlook for an improved demand for plain shapes is considered better. The contract for the steel for the Arcade Building, 1200 tons, is understood to have been definitely placed with the leading interest. Bridge work aggregating 3000 tons for the Baltimore & Ohio Railroad is pending, while several fair-sized building propositions are developing. Competition for fabricated work is sharper. Deliveries on practically all classes of plain shapes have been steadily improving. Prices of plain shapes are unchanged at 1.60c. to 1.65c., delivered in this district.

Sheets.—The volume of business is fully maintained, although made up largely of day-to-day orders. Specifications are heavy, and mills are being urged for shipments. Prices of No. 10 blue annealed sheets are firmly maintained, although some weakness in prices of lighter sheets is noted. Western No. 10 blue annealed sheets are quoted at 1.90c., delivered, with Eastern mills naming the same price, except where very prompt delivery is required, for which 1.95c. is obtained.

Bars.—Business in iron bars continues light. Some mills are more anxious for business, and ordinary iron bars are weak at 1.40c., mill, or 1.47½c., delivered in this vicinity. On the better grades up to 1.57½c. here is obtained. More negotiations for contract steel bars are pending, but business closes slowly. A considerable tonnage of concrete bars is being figured on. Steel bars are firm at 1.55c., delivered.

Coke.—Producers continue to maintain quotations for both contract and prompt coke. Buyers hold off but apparently make no impression on sellers. One large consumer has inquiries out for both prompt and third quarter furnace coke. Small sales of foundry coke have been made at $3 to $3.25 at oven. Contract furnace coke is held at $2.35 to $2.50 at oven, while prompt furnace coke is quoted at $2 to $2.10. The following range of prices, per net ton, is named for delivery in buyers' yards in this vicinity:

Connellsville furnace coke	$4.05 to $4.50
Connellsville foundry coke	4.90 to 5.35
Mountain furnace coke	3.75 to 4.10
Mountain foundry coke	4.50 to 5.00

Old Material.—Few consumers are showing any interest in the market. Heavy melting steel has been purchased in small lots by consumers at $11.50, delivered, but $12 would be paid for tonnage. Rolling mill grades are exceedingly hard to move. Carwheels are quiet, recent purchases being for the account of short sellers. There has been no movement in borings or turnings, buyers' and sellers' ideas of prices being widely divergent. Quotations are entirely nominal, and in the majority of grades not enough business is moving to establish prices. An approximate range for delivery in buyers' yards in this district, covering eastern Pennsylvania, taking freight rates varying from 35c. to $1.35 per gross ton, is as follows:

No. 1 heavy melting steel	$11.50 to $12.00
Old steel rails, rerolling (nominal)	14.50 to 15.00
Low phosphorus heavy melting steel scrap (nominal)	16.00
Old steel axles (nominal)	17.50 to 18.00
Old iron axles (nominal)	25.00
Old iron rails	17.50 to 18.00
Old carwheels	13.00
No. 1 railroad wrought	14.50 to 14.75
Wrought-iron pipe	11.50 to 12.00
No. 1 forge fire	10.50 to 11.00
No. 2 light iron (nominal)	6.00
No. 2 cut busheling	8.00 to 8.25
Wrought turnings	8.00 to 8.25
Cast borings	8.00 to 8.25
Machinery cast	13.00 to 13.50
Grate bars, railroad	9.50 to 10.00
Stove plate	9.50 to 10.00
Railroad malleable (nominal)	12.00

Cleveland

CLEVELAND, OHIO, June 24, 1913.

Iron Ore.—Ore carriers have been delayed considerably during the week by fogs and hence estimates of the June movement are not as large as were made earlier in the month. Although shipments continue very heavy, contract boats are able to handle all the ore, and there is practically no demand for wild tonnage. We quote prices as follows: Old range Bessemer, $4.40; Mesaba Bessemer, $4.15; old range non-Bessemer, $3.60; Mesaba non-Bessemer, $3.40.

Coke.—M. A. Hanna & Co., who had been in the market for 4000 to 5000 tons of furnace coke per month for the last half for their Fannie furnace, have covered for a large part of their requirements, on which prices ranged from $2.15 to $2.50. Foundry coke is somewhat more active, but not firm. There has been a moderate amount of contracting for the last half and at least on part of this business recent prices have been shaded. We quote standard 72-hr. foundry coke for prompt shipment and last half at $2.75 to $3 per net ton at oven.

Pig Iron.—There is a better volume of inquiry from outside of this immediate territory. Local sellers are figuring on several round lot inquiries from various points. One local interest reports sales this month aggregating about 25,000 tons. In the Cleveland territory the market continues dull. The largest inquiry pending in northern Ohio is from the Griscom-Russell Company, Massillon, which is in the market for 2000 tons for the last half, 1000 tons of No. 1, 700 tons of No. 2, and 300 tons of No. 3. Local sellers are no longer trying to get over $14.75 for No. 2 foundry, delivered, Cleveland, and it is probable that this price could be shaded. In the Valley the $14 price for No. 2 appears to be well maintained. Shipments on contracts con-

tinue heavy. Many consumers apparently think that prices may go lower and will cover for the requirements during the next month or two by buying spot iron instead of placing last half contracts. Bessemer iron is weak at about $16 Valley furnace. Southern iron is weaker, being quoted at $10.50 to $10.75, Birmingham, for No. 2. For prompt shipment and during the remainder of the year we quote, delivered Cleveland, as follows:

Bessemer	$16.90 to $17.15
Basic	15.25
Northern No. 2 foundry	14.75
Southern No. 2 foundry	14.85 to 15.10
Gray forge	14.50
Jackson County silvery, 8 per cent. silicon	20.55

Old Material.—The demand is light and prices are weak. Two local mills are holding back on shipments. The bar iron mills in Cleveland will shut down this week and will be out of the market for some time. Sales of heavy steel scrap have been made to a local consumer at less than $11. We have reduced our quotations on this grade 50c. a ton. It is doubtful if local mills would pay over $10.75 at present for ordinary steel scrap. A large amount of scrap is being offered by producers. Dealers generally are pessimistic regarding the outlook. Quotations, which are largely nominal, are as follows:

Per Gross Ton.

Old steel rails, rerolling	$13.00 to $13.50
Old iron rails	14.50 to 15.00
Steel car axles	17.00 to 17.50
Heavy melting steel	10.75 to 11.00
Old carwheels	13.00 to 13.25
Relaying rails, 50 lb. and over	23.00 to 25.00
Agricultural malleable	10.75 to 11.25
Railroad malleable	12.00
Light bundled sheet scrap	9.00 to 9.50

Per Net Ton.

Iron car axles	$21.00 to $22.00
Cast borings	6.25 to 6.50
Iron and steel turnings and drillings	4.50
Steel axle turnings	8.00 to 8.50
No. 1 busheling	10.00 to 10.25
No. 1 railroad wrought	11.50 to 12.00
No. 1 cast	11.25 to 11.75
Stove plate	8.00 to 8.50
Bundled tin scrap	11.00 to 11.50

Finished Iron and Steel.—Of special interest in semi-finished steel lines is the announcement that the Cleveland City Forge & Iron Company will build an open-hearth plant to make billets for its forge shop, and the completion of the fifth 65-ton open-hearth furnace by the Upson Nut Company, Cleveland. It will start up about July 1. This additional furnace will give the company 2500 to 3000 more tons of billets to dispose of per month on the open market. Generally the market shows an improvement in specifications and inquiries as well as in sentiment. There is considerable inquiry for steel for early delivery. Some of the agricultural implement makers who had been holding off placed steel bar contracts during the week for the full year at 1.40c. For early delivery steel bars are quoted at 1.45c. and plates and structural material at 1.45c. to 1.50c. Owing to better deliveries on soft steel bars makers of hard steel bars have reduced prices $2 a ton to 1.40c., Pittsburgh. The structural situation is satisfactory and local fabricators have enough work on hand to keep them busy for some time. Contracts placed during the week include the following: Plant for the Toledo-Owens Glass Sand Company, Silica, Ohio, 225 tons, to the McClintic-Marshall Construction Company; factory buildings for the International Harvester Company, 400 tons, and Star Drilling Machine Company, 200 tons, both at Akron, Ohio, to the Berger Iron Company, Akron; factory building for the Federal Improvement Company, Cleveland, 150 tons, to T. H. Brooks & Co., Cleveland. Inquiries are out for 500 tons of reinforcing bars for a warehouse for the H. C. Christy Company, Cleveland, and for 300 tons for a building for the Firestone Tire & Rubber Company, Akron. At a meeting of rivet makers in Cleveland, June 18, the situation was discussed and as a result the price irregularity that has prevailed recently has disappeared through the reduction in regular quotations to 2c. for structural rivets and 2.10c. for boiler rivets for desirable orders in carload lots and over. The new price for less than carload lots is 2.10c. and 2.20c. It is stated that buyers are satisfied with the reduction and that there has been considerable contracting for the last half at the new prices. Bolt and nut prices are firmer and considerable business has been placed at regular prices. The demand for sheets is light and prices are weak. Black sheets are quoted at 2.25c. for No. 28 and galvanized sheets at 3.30c. or lower for No. 28. Bar iron prices are unchanged at 1.55c. to 1.60c. The two local mills of the Union and Empire rolling mill companies will shut down June 28 for repairs and will probably not resume operation for 30 days. Warehouse prices are unchanged at 2.10c. for steel bars and 2.25c. for structural material.

Cincinnati

CINCINNATI, OHIO, June 25, 1913.—(*By Telegraph.*)

Pig Iron.—The Southern situation is so complicated that it is hard to arrive at any stable quotations. Rumors, that are not without verification to an extent, have placed Southern iron below recent market prices. However, it is understood that these reports have been largely attributable to an effort on the part of several Southern iron warrant owners to unload their holdings. On the other hand, it is known that at least one furnace in the South has found it expedient to meet the views of buyers, although its reported sales do not include any large tonnages. Several small authentic sales of No. 2 Southern foundry were made last week at $11, Birmingham basis, but most of the business now being transacted is on a lower level. Prices on both Southern and Northern iron are about the same as reported for either prompt or last half shipment, and while it is probable that small lots of iron could be bought for prompt movement below $10.50, Birmingham, or $14.50 Ironton, very favorable conditions would have to govern any sales at these figures. A northern Indiana radiator company purchased last week approximately 3000 tons of analysis iron, which is the largest sale lately made public in this territory. Several foundry iron inquiries are pending, and two Central Western manufacturers are interested in basic. It is also stated that one nearby agricultural implement maker will soon purchase a quantity of malleable. Based on freight rates of $3.25 from Birmingham and $1.20 from Ironton we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 foundry and 1 soft	$14.25 to $14.75
Southern coke, No. 2 foundry and 2 soft	13.75 to 14.25
Southern coke, No. 3 foundry	13.25 to 13.75
Southern, No. 4 foundry	12.75 to 13.25
Southern gray forge	12.25 to 12.75
Ohio silvery, 8 per cent. silicon	20.20 to 20.70
Southern Ohio coke, No. 1	16.70 to 17.20
Southern Ohio coke, No. 2	15.70 to 16.20
Southern Ohio coke, No. 3	15.45 to 15.95
Southern Ohio Malleable Bessemer	15.70
Basic, Northern	15.70 to 15.95
Lake Superior charcoal	18.75 to 19.25
Standard Southern carwheel	27.25 to 27.75

(By Mail)

Coke.—Foundrymen are doing considerable contracting, but furnace operatives are hesitating. Coke producers are reported to have curtailed Connellsville production, and the reasonably good demand for coal in all districts has had a strengthening effect on coke. The labor situation is one that is also a factor to be reckoned with, having a tendency to keep prices close to the present level. Freight rate reductions will affect this territory to some extent, but how far is not yet known. Quotations in all three producing districts are about the same. Furnace coke is quoted around $2.10 to $2.20 per net ton at oven, for prompt shipment, but contract figures range from $2.25 to $2.50. Foundry coke is quoted from $2.65 to $3.25 per net ton at oven, with the bulk of orders now being placed running close to $3 for either prompt or future shipment.

Old Material.—Common reports would indicate that the bottom had dropped out of the market. Very little buying is being done by the foundries, and the rolling mills are slow in contracting for any future supplies. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices f.o.b. at yards:

Per Gross Ton.

Bundled sheet scrap	$7.25 to $7.75
Old iron rails	12.25 to 12.75
Relaying rails, 50 lb. and up	19.75 to 20.25
Rerolling steel rails	11.25 to 11.75
Melting-steel rails	9.50 to 10.00
Old carwheels	11.00 to 11.50

Per Net Ton.

No. 1 railroad wrought	$9.25 to $9.75
Cast borings	4.75 to 5.25
Steel turnings	4.75 to 5.25
No. 1 cast scrap	9.00 to 9.50
Burnt scrap	6.50 to 7.00
Old iron axles	16.75 to 17.25
Locomotive tires (smooth inside)	10.25 to 10.75
Pipes and flues	6.00 to 6.25
Malleable and steel scrap	7.50 to 8.00
Railroad tank and sheet scrap	4.75 to 5.25

Finished Material.—Reports from the local sheet mill indicate that the demand for sheets is keeping up and that there is a chance for a very good export business. The export trade is a subject that is interesting

practically all sheet manufacturers in this section, and it is quite probable that it will receive more attention from other manufacturing branches. Local warehouses state that finished iron and steel products are moving at a satisfactory rate, and, while there is now no special call for any particular line, there is a healthy demand that is holding store prices firm on everything handled. Steel bars are quotable, from local stocks, around 2.05c. to 2.10c., and structural material about 5c. per 100 lb. higher.

Boston

BOSTON, MASS., June 24, 1913.

Old Material.—Conditions have changed very little, if any, since last week. Material is coming out to some extent, but consumers, according to the dealers, retain the upper hand in the market. The quotations given below are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of $2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices:

Heavy melting steel	$8.75 to $9.00
Low phosphorus steel	13.50 to 14.50
Old steel axles	13.50 to 14.00
Old iron axles	21.00 to 21.50
Mixed shafting	13.00 to 13.25
No. 1 wrought and soft steel	10.25 to 10.50
Skeleton (bundled)	7.50 to 8.00
Wrought-iron pipe	8.50 to 9.00
Cotton ties (bundled)	8.50 to 9.00
No. 2 light	3.50 to 4.00
Wrought turnings	5.25 to 5.50
Cast borings	5.25 to 5.50
Machinery, cast	11.50 to 12.00
Malleable	10.00 to 10.50
Stove plate	7.75 to 8.25
Grate bars	6.75 to 7.00
Cast-iron carwheels	13.50 to 14.00

Germany Contending with Depression

Syndicates Struggle to Maintain Trade Control—Export Allowances to Members

BERLIN, June 12, 1913.

The news from the iron trade this week has continued uniformly bad. Prices have further fallen, buying remains very light and the feeling of pessimism among manufacturers is evidently growing more pronounced. Foreign buying is very slow.

Prices Sink Further

The trading on the Düsseldorf Exchange June 6 brought out the following changes in prices as compared with May 30: Heavy plates, 122 to 127 marks, against 125 to 130 marks; boiler plates, 132 to 137 marks, against 135 to 140 marks; thin plates, 130 to 135 marks, against 132.50 to 137.50 marks. No quotation was fixed for bars in view of the negotiations for the organization of the trade. It is reported that the Band Iron Association has voted to reduce that specialty from 145 to 135 marks; but this has been denied. It is admitted, however, that the well-known Mannstaedt concern is selling as low as 135 marks.

In bars the fall of prices has grown more marked. Prices as low as 100 marks for the home market are heard of in the Rhenish-Westphalian district, while export prices are reported of 100 and even 98 marks, f.o.b. Antwerp, for German steel bars. The latter figure may be an exaggeration; but the Cologne Gazette is sponsor for the former price. It is clear that bars are the most sensitive spot in the trade. Foreign buying is light, Belgian works offering sharp competition at 98 to 100s. a ton, f.o.b. Antwerp. There is still considerable buying by the home trade, but only for short periods of delivery. According to a Cologne dispatch of this evening the committee having charge of the negotiations for a bar association is working hard toward effecting an organization of a firm character, but it is meeting with serious difficulties and no result is likely to be reached for some weeks.

Pig Production Heavier

The May production of pig iron established a new record with 1,641,600 tons. This is 13,500 tons more than for March, which had previously held the record, and 149,000 tons more than for May, 1912. While the furnaces are now about fully supplied with work for the rest of the year, shipments to Belgium are not so heavy as several months ago. The run of specifications remains quite brisk, but there is doubt as to whether this will continue long in view of the present dullness in finished goods. The demand for ores of all kinds remains heavy. Imports for May were unusually large, having reached 1,268,900 tons, as against 947,600 tons for May, 1912.

The reported intention of the Pig Iron Syndicate to grant a drawback on pig iron used in producing for export appears to be taking more definite shape now. The amount mentioned is 1.50 marks a ton. The Coal Syndicate, it is also reported, is considering the question of re-establishing its drawback of 1 mark a ton on coal for steel exporters, which was discontinued a year or two ago.

Business in semi-finished steel is evidently growing slacker, especially in the export trade. The export drawback of 5 marks a ton, it is now said, will not have much effect in stimulating exports of finished products in view of the extremely sharp competition of Belgian producers.

Steel rails remain the strongest section of the trade. All the mills are working at their utmost capacity. In grooved and light rails for mines the Union is badly behind with its deliveries. The foreign trade in rails appears to continue rather brisk, and prices are reported at about the same level as for the home trade. The May shipments of the Union reached 566,000 tons, which is almost exactly the same as for April, but 31,000 tons more than for May, 1912. A considerable shifting in products has occurred since a year ago, structural shapes having decreased 26,000 tons, while steel rails gained 64,000 tons. Shipments of semi-finished products were about 6000 tons less.

It is said that even in ship plates price concessions are now made, and this notwithstanding the fact that the Kontor has orders on its books for nearly a year ahead. The weakness is due to the fact that the Gelsenkirchen Company is now coming on the market with plates from its new works at Esch. There is, therefore, a sharp struggle for what business is being offered.

Wire Rod and Tube Combinations

The Wire Rod Association is now considering the question of granting an export drawback of 5 marks a ton on exported wire and wire nails, the Steel Works Union having increased its drawback by that amount. The shipments of rods in May fell to 36,100 tons, against 42,000 tons in April. The reduction was largely in the export trade.

The renewal of the tube combination last week, after it had been pronounced dead, has not greatly strengthened the hopes that it will be converted into a syndicate and perfected by the 20th, when its new life will go out again, unless something definite is done to keep it alive. It is planned to include foreign as well as home business; and the organization is to embrace all forms of steel tubing, but not cast-iron pipe. According to a Düsseldorf dispatch the prospects for the ultimate establishment of a syndicate are regarded as very doubtful.

Germany's exports of several leading classes of iron and steel in May compare as follows with last year:

Metric tons	1913	1912
Pig iron	72,950	88,480
Semi-finished steel	55,260	44,220
Beams	44,280	41,390
Steel rails, including grooved	50,060	42,980
Iron ties	11,000	4,430

The downward tendency in the Belgian market continues. At the end of last week cuts of 2.50 francs in the home price of iron bars and bands and 5 francs for steel bars were reported. This week semi-finished steel for export to England has been reduced 3s. Several days ago it was announced that efforts are also in progress in Belgium looking toward the organization of the bar trade. The manufacturers behind the movement propose that the new organization make an agreement with the German one, if the latter be really formed, for maintaining foreign prices.

St. Louis

ST. LOUIS, MO., June 23, 1913.

Pig Iron.—The past week has developed considerable inquiry on Southern foundry and malleable iron for last half delivery, buyers seeming to feel that so far as prices are concerned the bottom has about been reached. At the same time actual purchases are restricted to small lots for early delivery. Undoubtedly foundry requirements will make it necessary to enter the market shortly for third and fourth quarter; nevertheless it ap-

pears from developments that rather than place full contracts, as customary heretofore, monthly allotments will be the rule for a time. Inquiries aggregate several thousand tons, mostly in small lots, though included therein are one of 1000 tons of No. 2 Southern, one of 1000 tons of No. 3 Southern and several of 500 tons. All contract allotments are being absorbed freely.

Coke.—There has been some inquiry, but sales have been of the hand-to-mouth type for prompt delivery. The largest inquiry is for 5000 tons of 48-hr. coke for last half. By-product coke is selling on a parity with Connellsville figures. Shipments on contract are going forward fully, indicating steady consumption.

Finished Iron and Steel.—Business is keeping well up to recent levels. A number of the smaller railroads have closed rail contracts for small tonnages to be used in construction work. The frog and switch companies are fairly active, but are reporting restriction of purchases by the larger roads. Track fastenings are in only fair demand, with prices soft. In structural material fabricators report active business, but say new jobs are a little more scarce. They are accumulating a little stock so that the press for deliveries is not so marked. In bars there is continued activity. Agricultural and wagon concerns are active, and from their persistent demands for tonnages placed some time ago there is evidence that there is no let-up in their business. Reinforcing bars are in excellent demand. In light rails buying seems to be awaiting the later summer period when work will start to put the coal mines in shape for winter business. The next four to six weeks will see a heavier purchase of this commodity.

Old Material.—Prices are sagging again, and there is no demand. Rolling mills are shutting down for their annual repairs, and this adds to the pessimism as to scrap. There are some few inquiries for relayers, but as reported for some weeks none are to be had for early delivery. The railroad lists out to close this week are large and add to the depression. They include 3000 tons from the Burlington, 2000 tons from the Rock Island and 200 tons from a local industry. We quote dealers' prices, f.o.b. St. Louis, as follows:

	Per Gross Ton.	
Old iron rails	$11.25	to $11.75
Old steel rails, rerolling	11.50	to 12.00
Old steel rails, less than 3 ft.	10.00	to 10.50
Relaying rails, standard section, subject to inspection	23.00	to 24.00
Old carwheels	12.50	to 13.00
Heavy melting steel scrap	10.50	to 11.00
Frogs, switches and guards cut apart	9.25	to 9.75
	Per Net Ton.	
Iron fish plates	$10.50	to $11.00
Iron car axles	18.00	to 18.50
Steel car axles	15.50	to 16.00
Wrought arch bars and transoms	13.00	to 13.50
No. 1 railroad wrought	9.25	to 9.75
No. 2 railroad wrought	9.00	to 9.50
Railroad springs	8.00	to 8.50
Steel couplers and knuckles	8.00	to 8.50
Locomotive tires, smooth	10.00	to 10.50
No. 1 dealers' forge	6.50	to 7.00
Mixed borings	4.00	to 4.50
No. 1 busheling	8.00	to 8.50
No. 1 boilers, cut to sheets and rings	5.00	to 5.50
No. 1 cast scrap	8.75	to 9.25
Stove plate and light cast scrap	7.00	to 7.50
Railroad malleable	8.00	to 8.50
Agricultural malleable	7.00	to 7.50
Pipes and flues	5.75	to 6.25
Railroad sheet and tank scrap	4.00	to 4.50
Railroad grate bars	6.25	to 6.75
Machine shop turnings	5.25	to 5.75
Bundled sheet scrap	4.25	to 4.75

British Financial Condition Unsettled

Scotch Banks Liquidating Pig-Iron Warrants—General Feeling of Insecurity

(By Cable)

LONDON, ENGLAND, June 25, 1913.

Financial conditions are unsettled, hitting all markets. Scotch banks are liquidating pig-iron warrants held as collateral. A general feeling of insecurity prevails, but the worst may now have been seen temporarily. No change for the better has taken place in semi-finished steel; the French are still cutting severely. Buying of finished iron and steel remains in abeyance, but the Standard Oil Company is again inquiring for tin plates.

The liabilities of the bankrupt firm of James Watson & Co. are stated at £399,000; assets, £130,000. Peter Donaldson, the chief partner, has been found drowned in the Clyde. Stocks of pig iron in Connal's stores are 218,682 tons, against 225,859 tons a week ago. We quote as follows:

Cleveland pig-iron warrants (Tuesday), 54s. 5d., against 55s. 7½d. a week ago.

No. 3 Cleveland pig iron, makers' price f.o.b. Middlesbrough, 55s., a decline of 9d.

Ferromanganese, £11 12s. 3d., f.o.b. shipping port.

Steel sheet bars (Welsh) delivered at works in Swansea Valley, £5, a decline of 5s.

German sheet bars, f.o.b. Antwerp, 92s. 6d. nominal.

German 2-in. billets, f.o.b. Antwerp, 82s. 6d. nominal.

German basic steel bars, f.o.b. Antwerp, £4 18s. to £4 19s., a decline of 3s.

French blooms, 77s. f.o.b. shipping port.

French sheet bars, 82s. 6d. f.o.b. shipping port.

Steel bars, export, f.o.b. Clyde, £7 10s., a decline of 5s.

Steel joists, 15-in., export, f.o.b. Hull or Grimsby, £6 15s., a decline of 2s. 6d.

German joists, f.o.b. Antwerp, £5 12s. to £5 15s.

Steel ship plates, Scotch, delivered local yards, £8 7s. 6d.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £9 5s.

Steel rails, export, f.o.b. works port, £6 15s.

Tin plates, cokes, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 13s. 6d., a decline of 1½d.

The Watson Firm May Pay 30 Per Cent. —Pig Iron Likely to Be Supported

(By Mail)

LONDON, June 14, 1913.

Interest has been pretty well centered lately on the disastrous ending of the efforts to corner the pig iron market, the largest iron house in this country and one with world-wide ramifications having collapsed. It may pay 30 per cent. All sorts of tales are about as to the cause of the suspension, but the long and the short of it is that the firm had got a bigger load than it could carry. London firms are involved which had been financing the iron or part of it, one house having 13,000 tons and another 25,000 tons, some of which at least seems to have been unmargined, while Scotch banks are in a similar position. The immediate cause of the failure was the calling of margins which James Watson & Co. could not provide. The iron left over has been taken, however, by the finance people and the banks, who will, of course, nurse it for a rise. Under these circumstances the Cleveland market may keep pretty sound for a time, for it is not to the interest of anybody to start smashing prices. As a matter of fact there is not much profit in producing at present rates. Trade demands have been rather poor, but now that the tangle has been unraveled it is just possible things may take a turn for the better. A lot of ugly labor troubles have been threatened in all parts of the country, but those in connection with the shipbuilding industry are now likely to be averted. On the other hand there is a very general stoppage of works in the Midlands owing to disputes as to wages, which have far outrun the original storm center.

Cutting in Semi-Finished Steel

Undoubtedly the weakest spot is the market for semi-finished steel where the French works have been cutting prices to rags in their efforts to secure orders to keep plant running. The Belgians have been meeting the competition to some extent, but the Germans, who entertain a good opinion of the market owing to their order books being so full on home trade account, have for the most part been holding aloof. At all events they have not been cutting prices to anything like the extent seen elsewhere. French sheet bars have sold this week at 95s. c.i.f. Newport, while billets have been done at 80s. f.o.b. Antwerp and even a shade less. The Germans have sold some very fair lines lately for last half, and look for better prices as soon as the French selling subsides. One or two of the French works are now out of the market, having sold all they want to, and this is taken as a good omen.

The tin plate trade is having a worrying time, for in spite of the fact that the Americans have bought very heavily recently the fundamental position is unsound, with a great scarcity of new business, while what is obtainable is taken at ruinous prices. With tin at £210 a ton and sheet bars at £5 5s., it is estimated that the actual cost of production is close upon 14s. 6d. a box, while the selling price today is no better than 13s. 7½d. The galvanized sheet trade is a weak spot also, with prices on the down grade, and today Welsh works have sold at the equivalent

of £10 12s. 6d., f.o.b. Liverpool, for 24-gauge (about 2.30c.).

In finished steel there is literally nothing doing, and unless there is a change for the better very soon works will have to go on short time. There is no fresh buying by ship owners and not likely to be at these prices, and with every sign of trade reaction.

Birmingham

BIRMINGHAM, ALA., June 23, 1913.

Pig Iron.—The open recession to $11 on the part of most furnace interests failed to produce the quantity of business expected. There were many inquiries involving a large tonnage, but sales scarcely increased in volume. As heretofore the case, the sales which are definitely known brought the full market price or over. No higher price than $11 is considered in competitive territory, but better than that is secured in Alabama. The foundry demand has begun to fall off. The larger pipe shops have curtailed to a point where the furnaces feel it. Sales of special analysis iron have been made at $12, an amount involving 500 tons going at that figure. No. 2 in carload lots has sold at $11.25 and No. 3 has brought $10.75 straight along, with consumers apparently fully willing to pay that price for this grade. Stocks are accumulating and order books are being gradually cleaned up. Basic iron is an exception, the indications pointing to a maintenance of the normal demand for the entire summer. There is reason to believe that if consumers insist on lower levels still, there will be a considerable curtailment of production. Prices per gross ton, f.o.b. furnaces in Alabama (first column representing competitive territory and the second prices for favorite brands in Southern territory) are as follows:

No. 1 foundry and soft	$11.50 to $12.00
No. 2 foundry and soft	11.00 to 11.50
No. 3 foundry	10.75 to 11.25
No. 4 foundry	10.50 to 11.00
Gray forge	10.25 to 10.75
Basic	11.00 to 11.25
Charcoal	24.50 to 25.00

Cast-Iron Pipe.—The larger concerns find themselves unable to maintain normal operations owing to the absence of sizable contracts, and further curtailment of production is reported. Small quantities for extensions represent about the only business and prices are said to be shaded to secure them. Pipe makers are still watching the iron market. We quote 4 in. at $21 and 6 in. and upward at $20, with $1 added for gas pipe.

Coal and Coke.—While the consumption of furnace coke has been curtailed to an extent by the blowing out of two furnaces, the general trade has not been affected, owing to the outside and general demand. Prices are firm and all the coke manufactured finds a ready market. We quote, per net ton, f.o.b. oven: Furnace coke, $3 to $3.50; foundry, $3.50 to $4.25. Coal mine operations are at usual capacity and prices are well maintained.

Old Material.—Continuing to follow the lead of the pig iron market, old material is in small demand. Some cast and steel scrap have been sold under market prices, but otherwise little trading has been done. Nominal prices, not always adhered to, per gross ton, fo.b. dealers' yards, are as follows:

Old iron axles (light)	$15.00 to $15.50
Old steel axles (light)	15.00 to 15.50
Old iron rails	13.50 to 14.00
No. 1 R. R. wrought	12.00 to 12.50
No. 2 R. R. wrought	10.00 to 10.50
No. 1 country wrought	9.50 to 10.00
No. 2 country wrought	8.50 to 9.00
No. 1 machinery cast	9.50 to 10.00
No. 1 steel scrap	10.50 to 11.00
Tram carwheels	10.50 to 11.00
Standard carwheels	12.00 to 12.50
Light cast and stove plate	8.25 to 8.75

New York

NEW YORK, June 25, 1913.

Pig Iron.—Buying has not yet resulted from the large inquiries of which a good deal has been heard in the past few weeks, but some part of them may be closed within a few days. Attention is particularly converging on New England business in basic and malleable pig iron. The one Connecticut concern inquiring for the former will want about 2000 tons a month, but it is not yet decided whether buying will be for the third quarter only or for the entire second half. Eastern Pennsylvania and Buffalo furnaces are bidding on this business, the former at a price at furnace equivalent to about $15.50 delivered in eastern Pennsylvania. Several manufacturers of malleable castings in Connecticut are in the market for iron, as are also Wilmington, eastern Pennsylvania and New York State foundries in the same line. Evidently a fair amount of business in foundry iron has been closed, though for the most part in small lots, without any general sending out of inquiries. These transactions are the result of offers by buyers in most cases. Where inquiries go out and some eagerness for business is shown, the buyer is generally frightened off the track by finding his last quotation lower than the preceding one. The Pennsylvania Railroad is understood to have closed for half of the 9000 tons for which it inquired some time ago. A portion of it was charcoal iron. Pipe foundries are getting fresh bids on pig iron, in view of the purchase of cast iron pipe that will be made by New York City for its high pressure system, the previous inquiry having been increased to 15,000 tons. Buffalo furnaces are quoting No. 2 foundry at $14 to $14.25 and malleable at close to $14.50, at furnace. The all-rail freight from Buffalo to Jersey City is $2 and the canal freight has been $1.40, with a 15-cent loading charge additional. Buffalo iron is quoted for tidewater delivery at $15.75 to $16.25, the price at furnace on water shipments figuring somewhat above the quotation at furnace on all rail shipments. We quote Northern iron for tidewater delivery as follows: No. 1 foundry, $16.25 to $16.75; No. 2 X, $15.75 to $16.25; No. 2 plain, $15.50 to $15.75. Southern iron is quoted at $16.50 to $16.75 for No. 1 foundry and $15.75 to $16 for No. 2.

Structural Material.—Building work involving steel construction is not as active in the East, and new inquiries have not been as plentiful in the past week. Some railroad work is being figured on, but there is less in this line in the East than in the West and Central West. The Baltimore & Ohio inquiry for 2800 tons is still pending. Some export business is up, including several thousand tons for South America and Cuba. The American Bridge Company has been awarded 1150 tons for an arcade at Philadelphia, and 1500 tons is said to have been closed for the Philadelphia & Reading track elevation in Philadelphia. Bids were to go in yesterday on 4000 tons for section 4 route 4 of the New York subway extensions. Bids have gone in on 200 tons for a bridge on the White River Junction Railway in Vermont. The Lehigh Valley Railroad Company has placed 500 tons of bridges with the Phoenix Bridge Company, Philadelphia. In general, small order business in New York is reported to be of fair volume. Rather prompter shipments of plain material are made by one or two Pennsylvania mills and deliveries can be had in July at 1.45c., Pittsburgh, or 1.61c., New York. From store we quote plain material at 2.10c. to 2.15c.

Plates.—Deliveries are easy and are reported to be made in less than a week in some cases. New demand is fair with an absence of large contracts. A hesitancy is noted on the part of consumers to renew contracts for the last half. Bids go in this week on the six 10,000-ton ships for the Hamburg-American Panama Service which will require about 20,000 tons of plates, and on two submarine boats for the United States Government calling for about 8000 tons of plates. Quotations continue at 1.61c. to 1.66c., New York, for mill shipments in the last half and 1.76c., New York, for quick delivery, though there is no doubt that the tendency is downward for the latter, with some business being done at 1.50c., Pittsburgh, or 1.66c., New York.

Bars.—New inquiries and orders are reported better than a month ago and the general sentiment is good, with most contracts for the last half renewed or about to be closed. There is an occasional cancellation, due not to any falling off in business of consumers, but to their ability to get prompter deliveries from another mill. One manufacturer is able to make rather good promises for summer shipment; another leading bar producer, on the other hand, is sold up until late in the year. Several lots of bars for concrete reinforcement have been closed or are pending, including 800 tons for the Brooklyn approach of the Manhattan bridge. We quote bar iron at 1.60. to 1.65c., New York, and steel bars at 1.56c., New York, deliveries depending on the mill. Store prices are reported unchanged at 2c. to 2.05c. for steel bars and 2.05c. to 2.10c. for iron bars.

Cast-Iron Pipe.—The city of New York will again open bids July 2 on the extension of the high pressure fire prevention system, requiring about 11,000 tons of pipe, which was awarded to John J. F. Mulcahy some time ago, but on which no contract was consummated. Other work will be let by the city July 1 and 3.

amounting to about 4000 tons. The city of Fitchburg, Mass., will open bids June 30 on 400 tons. The large contract at Hartford, Conn., had not been awarded at last advices. General buying of pipe has improved somewhat. Carload lots of 6 in. are quoted at $23 to $24 per net ton, tidewater, New York.

Old Material.—Conditions are exceedingly unsatisfactory. Consumers are making no inquiry, and dealers are unable to effect sales without making sacrifices. The market has latterly shrunk so low that holders are unwilling to part with their property unless forced to do so by financial reasons. Quotations are almost wholly nominal, being about as follows, per gross ton, New York:

Old girder and T rails for melting	$9.00 to $9.25
Heavy melting steel scrap	9.00 to 9.25
Relaying rails	22.00 to 22.50
Rerolling rails	12.00 to 12.50
Iron car axles	20.50 to 21.00
Steel car axles	14.00 to 14.50
No. 1 railroad wrought	11.75 to 12.25
Wrought iron track scrap	11.00 to 11.50
No. 1 yard wrought, long	10.50 to 11.00
No. 1 yard wrought, short	10.00 to 10.50
Light iron	4.00 to 4.50
Cast borings	5.25 to 5.50
Wrought turnings	5.25 to 5.50
Wrought pipe	8.75 to 9.00
Old car wheels	12.00 to 12.50
No. 1 heavy cast, broken up	10.25 to 10.75
Stove plate	8.25 to 8.50
Locomotive grate bars	7.00 to 7.50
Malleable cast	8.50 to 9.00

Ferroalloys.—The quotation for 80 per cent. ferromanganese is $61, Baltimore, but there is little inquiry or selling at this price. In the almost complete absence of demand, resale lots are no factor. Although the market is dull in the way of new business, deliveries continue to be made freely against old contracts. In 50 per cent. ferrosilicon a quiet but steady business is being done at $75, Pittsburgh, for carloads, $74 for 100 tons and $73 for 600 tons or over.

Buffalo

BUFFALO, N. Y., June 24, 1913.

Pig Iron.—Buyers appear to be displaying rather more interest than for some weeks, and while quite a large proportion of the inquiry is in the nature of an endeavor to find out just how low iron can be bought without coming sufficiently into the market to buy, a considerable number of live inquiries are before producers. Sales for the week have amounted to about 5000 tons of all grades, made up of comparatively small lots, 500 tons being about the largest. Further interest among malleable iron users is also noted but without much of the inquiry crystallizing into orders. The volume of consumption in all grades is still curtailed to some extent by labor unrest. Prices remain practically the same as for the previous week, except that malleable is a trifle lower, averaging 25c. per ton. We quote as follows for third quarter and last half delivery, f.o.b. Buffalo:

No. 1 foundry	$14.50
No. 2 X foundry	$14.25 to 14.50
No. 2 plain	14.00 to 14.25
No. 3 foundry	14.00
Gray forge	14.00
Malleable	14.25 to 14.75
Basic	15.25 to 15.75
Charcoal	16.00 to 17.00

Old Material.—While the market continues exceedingly dull in practically all lines, a slight improvement is noted in the demand for old car wheels. We quote as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	$11.50 to $12.00
Boiler plate, sheared	13.00 to 13.75
No. 1 busheling scrap	10.50 to 11.00
No. 2 busheling	8.00 to 8.50
Low phosphorus steel	16.50 to 17.00
Old iron rails	15.00 to 15.50
No. 1 railroad wrought	13.00 to 13.50
No. 1 railroad and machinery cast scrap	13.50 to 14.00
Old steel axles	17.00 to 17.50
Old iron axles	23.00 to 23.50
Old carwheels	13.00 to 13.50
Railroad malleable	12.50 to 12.75
Locomotive grate bars	10.00 to 10.50
Stove plate (net ton)	9.75 to 10.00
Wrought pipe	9.50 to 10.00
Wrought iron and soft steel turnings	6.00 to 6.50
Clean cast borings	6.50 to 7.00
Bundled tin scrap	16.00

Finished Iron and Steel.—There is a better feeling in this market than for some time. Specifications are coming in at the rate of fully 75 per cent. of the productive capacity of mills, and if ordering at the present rate is maintained they will be kept busy well through the year. Selling agencies believe that there will be new placing of material in large volume within the next 60 days to meet current consumption, which is keeping up to a remarkable degree. Inquiry is good for railroad spikes and other track and railroad supplies, particularly for use on spur lines in lumbering districts. In fabricating structural material new business reported has been lighter. Bids are being taken for a school and social center building for the Notre Dame de Lourdes Church, Buffalo, requiring 120 tons, and for two apartment houses at Rochester, taking 100 and 150 tons respectively. The Lackawanna Bridge Company has received contract for an addition to the factory of the Aluminum Castings Company's Elmwood avenue plant, Buffalo, and the Phoenix Bridge Company, Phoenixville, Pa., has the contract for a highway bridge over the Erie Canal at Rochester, each taking a small tonnage.

Metal Market

NEW YORK, June 25, 1913.

The Week's Prices

Cents Per Pound for Early Delivery.

	Copper, New York.			Lead		Spelter	
June	Lake.	Electrolytic.	Tin, New York.	New York.	St. Louis.	New York.	St. Louis.
19	15.37½	14.75	45.05	4.35	4.22½	5.10	4.95
20	15.25	14.62½	43.60	4.35	4.25	5.10	4.95
21	15.12½	14.62½	.....	4.35	4.25	5.10	4.95
23	15.00	14.50	42.62½	4.35	4.22½	5.10	4.95
24	15.00	14.50	43.65	4.35	4.22½	5.10	4.95
25	15.00	14.50	44.10	4.35	4.22½	5.10	4.95

Copper is quiet and lower. After wide fluctuations tin is lower, but dull. Lead is unchanged except for a slightly better tone in the west. Spelter has better inquiry, but is without buying and change in price. Antimony is dull.

New York

Copper.—The week brought no buying worthy of note. Metal of a good grade, but not equal to prime Lake was offered at 15c., cash New York, and no takers were found. On actual prime Lake a bid of 14.75c. was made early in the week but holders refused to sell. The principal agencies are holding to 15c., delivered cash 30 days, for electrolytic but are not booking orders, as resale lots are offered and in some cases have been sold at 14.50c., cash, New York, and there is enough available to make the market. Reports have been current of electrolytic offered at 14.37½c., but these figures are unconfirmed. Several reasons are advanced for the extreme quiet which prevails in the copper market, among them the following: The fact that consumers are comfortably supplied for the present, falling off in new business received by consumers, tariff legislation and unsettled finances abroad. London quoted spot to-day at £64 2s. 6d. and futures at £64 7s. 6d. New York quotations to-day are 15c. for Lake and 14.50c. for electrolytic. Exports this month total 22,465 tons. The base price of sheet copper and copper bottoms has been reduced 1c., making the new base price for sheets 20c. and for bottoms 26c. per lb.

Pig Tin.—Business has been lacking for practically the same reasons enumerated in the copper report. In addition there are two features of interest, one the concentration of spot tin which, however, has not materially affected the market because of the lack of demand. Under other conditions a very effective corner might have resulted. This shortage will be relieved by the 875 tons which arrived on the Minnewaska June 24. The other feature is the apparently forced liquidation in London. The trade understands that Vienna operators who carried a large quantity of tin were compelled to unload because of the financial stringency in Austria. Reports are that the bank which was financing the operators called in some of its loans which explains the haste to sell in the latter part of last week and consequent lower prices which followed. Monday spot tin was down to £193 in London, representing a decline of £12 in four days. When the selling pressure subsided an improvement set in and there has been a recovery of about £6 which caused better prices in the New York market as a matter of course. The course of spot tin in London was as follows: June 18, £205 5s.; June 19, £204 15s.; June 20, £198 10s.; June 23, £193; June 24, £197 10s.; June 25, £199 10s. The London price for futures to-day is £200 10s. The quotation in New York to-day is 44.10c. Arrivals this month total 2975 tons and there is afloat 900 tons.

Lead.—About the only item of interest was a flurry in St. Louis last week, which caused the price to advance to 4.22½c., which still is asked. The rise was caused by the high price in London which mad it appear that London might pay better than the New York

price. The foreign market, however, reached its high level as the result of a corner which did not hold for more than two or three days, after which came a decline. In the domestic market consumers are buying in a hand-to-mouth fashion and are expected to continue doing so until there is some definite settlement of the tariff question. The New York price is 4.35c.

Spelter.—This metal is somewhat scarce for delivery two or three months ahead. Prompt delivery is more plentiful and offered at around 5.10c., New York, and 4.95c., St. Louis, but very large quantities would not be easy to get at these figures. Good inquiry has developed in the last three days, and better buying is expected. It is pointed out that consumers have stayed out of the market so long that their stocks are now at low ebb. Smelters of the better grades say that there is no profit for them in existing quotations.

Antimony.—Prices are without change at 8.15c. to 8.25c. for Hallett's, 8.60c. to 8.70c. for Cookson's and 7.50c. to 7.75c. for Chinese and Hungarian grades.

Old Metals.—The market is weak and dealers' selling prices are lower, being nominally as follows:

	Cents per lb.
Copper, heavy and crucible	14.00 to 14.25
Copper, heavy and wire	13.50 to 14.00
Copper, light and bottoms	12.50 to 13.00
Brass, heavy	8.75 to 9.00
Brass, light	7.50 to 7.75
Heavy machine composition	12.75 to 13.00
Clean brass turnings	8.50 to 8.75
Composition turnings	11.25 to 11.75
Lead, heavy	4.25
Lead, tea	4.00
Zinc, scrap	3.85

Chicago

JUNE 23.—A general depreciation in values, affecting all metals, marked the course of trading the past week. As regards copper, indications point to the establishment of some firmness at the minimum quotations, but the prevailing dullness gives little guarantee of a reaction toward higher values. For the scrap metals in the hands of dealers there is practically no demand and buying prices have slumped sharply. We quote as follows: Casting copper, 15c.; Lake, 15.25c., in carloads for prompt shipment; small lots, ¼c. to ⅜c. higher; pig tin, carloads, 44c.; small lots, 46c.; lead, desilverized, 4.35c. to 4.40c.; corroding, 4.60c. to 4.65c., for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 5.10c.; Cookson's antimony, 10.50c., and other grades, 9.75c., in small lots; sheet zinc is $7.25, f.o.b. La Salle or Peru, Ill., less 8 per cent. discount in carloads of 600-lb. casks. On old metals we quote buying prices for less than carload lots: Copper wire, crucible shapes, 12.50c.; copper bottoms, 11.75c.; copper clips, 12.75c.; red brass, 12c.; yellow brass, 8.50c.; lead pipe, 3.50c.; zinc, 3.75c.; pewter, No. 1, 32c.; tinfoil, 32c.; block tin pipe, 39c.

St. Louis

JUNE 23.—The metal market has been rather quiet and prices have been lower in most cases. Lead closed the week at 4.15c. to 4.17½c.; spelter, 5c.; Lake copper, 15.35c. to 15.60c.; electrolytic copper, 15.22½c. to 15.35c.; tin, 45.20c. to 45.50c.; antimony, Cookson's, 9.10c. to 9.35c. In the Joplin ore market, despite the dullness in metals and the lower prices, the production is keeping up to capacity. The range of the zinc blende prices was $42 to $44 per ton, but $43 got the most of the supply on the 60 per cent. basis. This brought the settlement for the best ores up to $46 as the top price. The general average was better than usual. Calamine sold at $20 to $21 for 40 per cent., with the settlements for the choicest lots reaching $24. Lead ore was quiet at $52.50. We quote as follows on miscellaneous scrap metals: Light brass, 5.50c.; heavy brass and light copper, 9.50c.; heavy copper and copper wire, 11c.; zinc, 3c.; lead, 3.50c.; pewter, 25c.; tinfoil, 34c.; tea lead, 3c.

Successful experiments have been conducted at the Commonwealth Naval Depot, Cockatoo Island, New South Wales, with the object of producing steel castings by the small converter process that would meet the requirements of the Commonwealth Navy.

The Peters Machine & Mfg. Company is now the name of the Diebold-Peters Company, manufacturer of high grade machinery and interchangeable automobile units and parts, Cleveland, Ohio. The organization remains the same as it has been for the past year.

Iron and Industrial Stocks

NEW YORK, June 25, 1913.

Prices of securities were showing some improvement when another unsettlement of values occurred on Saturday, ascribed primarily to the refusal of the Interstate Commerce Commission to reopen the application of the Eastern railroads for permission to advance freight rates. The decline, however, was partly due to the development of unfavorable financial conditions in Europe. Some recovery took place on Monday. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Am. Can, com.	25⅛- 28¾	Pressed Steel, pref.	91
Am. Can, pref.	84¼- 86⅞	Railway Spring, com.	23½- 25
Am. Car & Fdy., com.	40⅝- 43	Republic, com.	18 - 19⅝
Am. Car & Fdy., pref.	108½-109	Republic, pref.	74⅞- 76
Am. Loco., com.	28¾- 30⅝	Rumely Co., com.	20
Am. Loco, pref.	100	Rumely Co., pref.	41½
Am. Steel Foundries	25¾- 26	Sloss, com.	25 - 25¼
Bald. Loco., com.	41	Pipe, com.	9½- 9⅝
Bald. Loco., pref.	101 -101½	U. S. Steel, com.	50⅜- 54½
Beth. Steel, com.	27½- 29⅝	U. S. Steel, pref.	102½-104½
Beth. Steel, pref.	65⅛- 67	Va. I. C. & Coke	39
Colorado Fuel	26¾- 28	Westinghouse Elec.	57½- 60¼
Deere & Co., pref.	95⅞	Am. Ship, com.	45 - 45¾
Emer-Brant, com.	30	Am. Ship, pref.	97¾- 97½
General Electric	134⅝-136½	Chic. Pneu. Tool	48 - 49¼
Gr. N. Ore Cert.	29 - 33⅜	Cambria Steel	43½- 44⅜
Int. Harv., com.	104 -105½	Lake Sup. Corp.	22½- 24¼
Int. Harv., pref.	113 -114	Pa. Steel, pref.	62
Int. Harv., Corp.	103½-104½	Warwick	10
Int. Pump, com.	6½	Crucible Steel, com.	12¾- 13¼
Nat. En. & St., com.	10¾- 10⅞	Crucible Steel, pref.	85½- 87¼
Pressed Steel, com.	22 - 24⅛	La Belle Iron, com.	40¾- 41

Dividends Declared

The Westinghouse Electric & Mfg. Company, regular quarterly, 1¾ per cent. on the preferred stock, payable July 15, and 1 per cent. on the common stock, payable July 30.

The American Locomotive Company, regular quarterly, 1¾ per cent. on the preferred stock, payable July 21.

The Dominion Iron & Steel Company, Ltd., regular quarterly, 1 per cent. on the common stock, payable July 1.

The National Enamelling & Stamping Company, regular quarterly, 1¾ per cent. on the preferred stock, payable June 30.

The Rhode Island Perkins Horseshoe Company, regular quarterly, 1 per cent. on the preferred stock, payable July 15.

The Safety Car Heating & Lighting Company, regular quarterly, 2 per cent., payable July 1.

The Standard Screw Company, 3 per cent. on the preferred stock and 2½ per cent. on the common stock, both payable July 1.

The Richmond Radiator Company, semi-annual, at the rate of 7 per cent. annually on the preferred stock, payable July 1. The dividend will date from December 7, the date of the formation of the company, which is the reorganization of the McCrum-Howell Company.

Manning, Maxwell & Moore, Inc., regular quarterly, 1½ per cent. on the capital stock, payable June 30.

The Chicago Pneumatic Tool Company, regular quarterly, 1 per cent., payable July 25.

A New Flexible Metallic Hose

A new type of flexible metallic rubber hose is manufactured in which the hose covering or armor consists of two wire coils fitting tightly around the hose. The wire of the inner coil is of somewhat smaller gauge than that of the outer coil, and when the hose is straight the small wire fits closely in the crevices of the larger outer coil, making a complete metallic surface. Bending the hose naturally causes the outer coil to spread open slightly on one side and the inner coil wire slips into the larger crevice, keeping the hose entirely covered with metal. Each coil is made of high tension galvanized wire of high carbon steel. An important feature of this hose, which is the product of the mechanical goods department of the Goodyear Tire & Rubber Company, Akron, Ohio, is its remarkable flexibility. Its construction being such that tangles and kinks are said to be impossible, it has been named the Kantkink flexible metallic hose. There are no edges to become frayed, sharp or broken, and it is claimed that it will neither elongate nor contract. A fabric hose is used which contains an oil resisting compound for preserving the rubber. A special coupler is not required, the coupling being made by putting a nipple on the end of a section of hose and securing the nipple in place by clamping a band around the outside.

Personal

H. P. Bope, vice-president Carnegie Steel Company, delivered an address on "Banking and Business" before the bankers' convention at Pittsburgh, June 20.

John A. McGregor, president of the Union Iron Works, is reported by the newspapers of San Francisco as having returned from an Eastern trip with the belief that it is the intention of the Bethlehem Steel Company, owner of the works, to install as a part of its Pacific coast operations a plant for the production of finished steel products. The Union Iron Works has been greatly improved of late, and it is possible that it may build some of the vessels which are to carry ore from the Chilean mines to the Atlantic coast of the United States.

George H. Fristoe, formerly associated with the A. D. White Machinery Company, is now connected with the Rumely-Wacks Machinery Company, 121 North Jefferson street, Chicago.

Robert F. Hall, of the Universal Portland Cement Company, Chicago, has sailed for Europe to spend several months in the study of European highway construction. He will attend the Third National Roads Congress at London, June 23-28.

G. H. Neumiester has been elected president of the Lyons Machine & Mfg. Company, Muskegon, Mich., and will take active charge of the management.

P. W. Gates, president of the Hanna Engineering Works and treasurer of the Vulcan Engineering Sales Company, Chicago, is abroad on a six weeks' tour of Germany. President Gilbert of the latter company has just returned from Europe.

W. T. Todd, secretary Somers, Fitler & Todd Company, Pittsburgh, made an address on "Qualifications of the Salesman" before the Society of Supplies Salesmen, in that city, June 14.

Ira C. Ewing, for some time connected with the Reliance Heating Company, Pittsburgh, has resigned to accept the management of the Heating Engineering Supply Company, Commonwealth Building, Pittsburgh.

Martin J. O'Brien, formerly superintendent of the Volkmar Auto Starter Company, and Charles H. Severy, formerly with the Fallon Equipment Company, are now connected with the sales department of Walls, Bray & Co., 83 Walker street, New York, handling machinery, tools and supplies.

D. Fairfax Bush, of Crocker Brothers, New York City, sailed for Europe June 19, on a combined pleasure and business trip.

Emil Vilter, superintendent of the Vilter Mfg. Company, was elected president of the Engineers' Society of Milwaukee at the annual meeting June 12.

The Grashoff gold medal of the Society of German Engineers, which is the highest honor obtainable in the German mechanical field, has been awarded to George Westinghouse of Pittsburgh, it was announced at the annual meeting of the society at Leipzig, Germany, June 24. The decoration is given to the one who has done most important work in the engineering field. At the meeting were 300 members of the American Society of Mechanical Engineers.

William E. Corey, former president of the United States Steel Corporation, sailed for Europe June 24.

At a meeting of the stockholders of the Reeves Mfg. Company, Canal Dover, Ohio, maker of sheet metal building products, a proposition was presented to increase the capitalization from $500,000 to $1,000,000. It is stated that the capacity of the plant will not be increased but that the additional capital is needed because of the company's growing business.

The Edison Storage Battery Company, Orange, N. J., for its new building for the manufacture of storage batteries, has placed through the New York office of the Quigley Furnace & Foundry Company, Springfield, Mass., a contract for 59 of the Quigley patent overfired accurate temperature furnaces burning oil fuel.

Obituary

ARTHUR O. SMITH, president and general manager of the A. O. Smith Company, Milwaukee, Wis., died June 20 after an illness of several months, aged 54 years. He was a native of Wisconsin and as a young man engaged in the construction business in Chicago and Kansas City, returning to Milwaukee in 1896 to join his father and brothers in the establishment of a bicycle and parts factory under the name of the C. J. Smith & Sons Company. Six years later, with the growth of the automobile industry, he turned most of the shop, now owned principally by himself, into an automobile parts factory, which is now one of the largest of its kind in the world. He was responsible for the introduction of the pressed steel frame for automobiles and the A. O. Smith Company to-day produces more than 60 per cent. of all pressed steel frames used in automobile manufacture. His son, L. Raymond Smith, has been his chief assistant for several years, and it is expected that he will now become president and general manager.

EDWIN S. CRAMP died in New York City June 19, aged 61 years. His death followed closely after that of his father, Charles H. Cramp, which occurred June 6. Edwin S. Cramp was inclined toward marine engineering from youth and learned the business thoroughly in the employment of the William Cramp & Sons Ship & Engine Building Company, Philadelphia. Largely through his ability in this direction may be attributed the success of the company in winning a bonus of $500,000 for exceeding the speed contract for a vessel it built in 1894. He was general superintendent of the shipbuilding plant until 1901, when he became vice-president of the company, holding that position until his retirement seven or eight years ago. He was prominent in social as well as business and political circles and was a member of a number of clubs. He leaves a widow and two daughters.

PETER DONALDSON, Glasgow, Scotland, chief partner in the firm of James Watson & Co., who recently failed, has been found drowned in the Clyde, according to a cablegram from London June 24. He was also president and managing director of the Dayton Coal & Iron Company, operating two blast furnaces at Dayton, Tenn. He was 54 years of age and a bachelor.

CHARLES H. SPAULDING died at his home in Steubenville, Ohio, June 23, aged 72 years. For many years he was connected with the Jefferson Iron Works at Steubenville, one of the original concerns making cut nails. After it went out of existence he was president of the Spaulding Iron Works at Brilliant, Ohio. He leaves five daughters and three sons.

EDWARD Y. SWIFT, Detroit, formerly president of the Michigan Nut & Bolt Company, died June 15, aged 85 years. He was not only prominent as a manufacturer but as an attorney. He retired from active business in 1907.

Imataca Iron Mine Improvements.—The stockholders of the Canadian Venezuelan Ore Company, Montreal, Quebec, have authorized an additional issue of $500,000 of bonds, making the total amount outstanding $1,500,000. The proceeds are to be used for the purchase of a tug, building barges, extending track and purchasing additional machinery to increase the output of the Imataca iron mines in Venezuela.

W. E. Leard, Inc., Beaver Falls, Pa., is making extensive plant additions and within a short time will be in position to make machine forgings up to 12 ft. long and from 3 to 12 in. diameter. The firm, whose specialty is connecting rods, forgings, strap joints, etc., is in the market for two Lincoln type milling machines, 48-in. bed by 16 in. wide, motor drive. The additions to the plant will include heat treating furnaces, oil bath, a small brass and bronze foundry and a tool and store room, the latter 40 x 100 ft.

The Furness Bros. Company, 1613 West Walnut street, Chicago, has purchased from the estate of the late David Cumming, through the administrator, the business connected with the manufacture of the Cumming patent portable forges and hand blowers.

The U. S. Steel Corporation Dissolution Suit

(Continued from page 1549)

in payment therefor, will accept the bonds for $225,639,000 (par value) of the United States Steel Corporation to be secured by a mortgage upon all its property now held or hereafter acquired." It was further stipulated that a sinking fund of 1 per cent. per annum should be provided for. The letter further said:

It is understood that the bonds of the United Steel Corporation to be received by me will be ready for delivery on or before the first day of July, 1901. I am to receive a sum equal to my proportionate share as a stockholder of the monthly profits of the companies owned by the Carnegie Company until such time as the new bonds shall begin to bear interest or the United States Steel Corporation, at its option, may pay interest on the new bonds from February 1, 1901, in lieu of the interest on the Carnegie Company bonds and profits on stock deposited by me.

The above proposition is conditional upon your taking from the other stockholders of the Carnegie Company, if they desire, their shares of stock at the same price per share as I am to receive, to be paid in preferred and common shares of the United States Steel Corporation, namely, for each share of Carnegie Company stock, 15 shares of preferred and 15 shares of common stock of $100 par value, and that the remainder of the bonds of the United States Steel Corporation shall be reserved to acquire the bonds of the Carnegie Company.

J. P. Morgan & Co. replied to the letter as follows:

Referring to your letter of February 26, 1901, we would say that upon the understanding (already confirmed by Judge Reed and Mr. Schwab) that our undertaking is based upon the completion of the transaction as stated in your letter, or as approved by us jointly, and that (as arranged with you last evening over the telephone) the total bond issue may be $305,000,000, we beg to confirm the arrangement as proposed by you.

Judge Reed said that there had been a great deal of work in the negotiations with Mr. Carnegie. "It was a case of running back and forth," said he, "and we did not finish until February, although we started early in the winter. There were numerous meetings with Mr. Carnegie, and we had to look over the properties."

The Corporation's Policies

Judge Reed paid tribute to the skill and the judgment of Judge Gary in handling the United States Steel Corporation, incidentally referring to him in this manner:

The policies of which I spoke are always known as Judge Gary's policies, because he has been their prophet and high priest, and the first man to insist on them. He has gradually brought the finance committee and the board of directors and the active officers of the corporation into line with his own views until to-day I can say that the board is unanimous in following him. You might say that his policies have become the common law of the corporation.

The corporation's policy in no way, said Judge Reed, attempted to drive competitors out of business. Neither did the corporation purchase supplies of pig iron, in excess of its needs, so as to artificially maintain prices. Minutes from different meetings of the Carnegie Steel Company, at which Judge Reed, as director, was present, were read into the record. It was recorded in the minutes of one meeting in 1902, after the corporation had been formed, that H. P. Bope, sales manager of the Carnegie Company, reported that the American Sheet & Tin Plate Company contemplated a cut in prices when business was slack that would put 90 per cent. of its competitors out of business. Judge Reed said that such action was against the policy of both the Carnegie Company and the Steel Corporation, and that the cut had not been made. He said that the first time he had ever heard of a wire pool was in 1909, at the time the pools were discovered by the Government.

An Interlocking Director

Mr. Lindabury referred to Judge Reed as an interlocking director and asked in what steel companies, along with the United States Steel Corporation, he is a director. Government counsel perused the bill of complaint, but did not find him named among the defendants mentioned. He answered that he is a director of the Pressed Steel Car Company and added that his directorship in that company reacted on him as president of the Bessemer & Lake Erie Railroad, as the officials of the car company were always desirous of having the railroad purchase its cars from them. He is also president of the Philadelphia Company, which, as a dispenser of natural gas, spent $1,000,000 last year in purchasing pipe. His connection with this company did not, he said, unduly influence him in making pipe purchase from the National Tube Company.

Judge Reed was cross-examined at length by Judge Dickinson. Being asked regarding the purchase of 65,000 tons of pig iron in 1903 by the Carnegie Company, he said that this tonnage was acquired for regular uses. He denied that it was purchased to sustain the market or for any ulterior purpose and explained that the Carnegie Company was not making all the pig iron it needed at the time. He remarked, however, that the Carnegie Company naturally wanted to maintain a fair price for steel products since it had several sliding scale contracts in force in 1903.

President Harry Coulby Testifies

Harry Coulby, president Pittsburgh Steamship Company, testified June 19 that the boats used by his company which is a subsidiary of the Steel Corporation, could transport only about 60 per cent. of the ore required by the corporation and that independent companies were hired to carry the rest. He said, however, that the corporation did not go into the market for the independent boats until after the independent manufacturers had obtained all the ore they needed and then the corporation paid the rates that previously had been fixed by the independent buyers of ore.

He said that great credit was due to the Carnegie Company and the Steel Corporation for the development of facilities in handling and transporting ore. He told of the invention of machines by which a 10,000-ton ore boat could be loaded in 25 minutes at the head of the lakes and unloaded in 2 hours and 50 minutes. Counsel for the corporation then submitted exhibits showing all boats on the Great Lakes engaged in ore carrying trade, compiled by Mr. Coulby.

President Thomas Lynch's Testimony

Thomas Lynch, of Greensburg, Pa., president of the H. C. Frick Coke Company, another subsidiary of the Steel Corporation, outlined the position which that company holds in the coke fields. In the Connellsville district of Pennsylvania the company increased its holding since 1901 from 60,000 to 72,000 acres. The remainder of the 600,000 acres in the district is owned, he said, by independents. In that district, in 1901, the Steel Corporation had 27 competitors. Today, he said, the corporation has 86 competitors.

From 1903 to 1911 the Frick Company did not sell to any one outside of the Steel Corporation, but had sold some to outsiders since 1911. Up to that year the Frick Company's output was not sufficient to fill the needs of the Steel Corporation, and the coke company had to buy coke in the open market. In 1906 its purchases amounted to about 1,000,000 tons. The Carnegie Company, he thought, paid as much for the coke it bought from the Frick Company as other customers paid.

The Steel Corporation's supply of coking coal, Mr. Lynch estimated, on the output of 1906, would last about 40 years. Taking the average annual production, however, the reserve would last about 50 years.

To show that the development of the coke industry had not been wholly taken over by the corporation, he said that in 1901 there were 27 individual companies manufacturing coke; in 1911 there were 84, and in 1913 there are 86. In 1901 the corporation produced about 79 per cent. of the Connellsville coke output and in 1911 about 53 per cent. Of the total coke production in the United States in 1901, the Connellsville district produced 52 per cent. and the corporation's ovens in the same year in that district produced 41 per cent. of the country's output. In 1912 the district produced 47 per cent. and the corporation's ovens totaled 26 per cent. of the country's output. He further gave figures showing that the corporation owns or leases, in the Connellsville region, about 72,000 acres of coking coal, whereas in Washington and Greene counties alone, in that region, there are about 450,000 acres.

Mr. Lynch's figures were confirmed and further details were given of the extent of unmined coking coal lands by John E. Boileau, a coal and coke expert, not in the employ of the corporation.

Contract Manager Davis Called

Arthur L. Davis, contract manager of the Eastern branch of the American Bridge Company, was put on the stand, and after testifying as to his familiarity with sales of structural steel, he verified a list of competitors. He said that the bulk of the contracts obtained by the American Bridge Company were let by competitive bidding and told in detail of contracts taken by the independents in competition.

Mr. Davis continued his testimony on Monday, June 23, going over the list of independent manufacturers and detailing the contracts they had taken in competition with his company. As showing the necessity for a large combination like the American Bridge Company and the aggregation of capital and plant, Mr. Davis said that a few years ago the shops in existence could not have turned out the material for the Woolworth Building or the Queensboro Bridge within the time required. He denied that the company had a monopoly when it was formed or that it has now. He said that in 1900 the American Bridge Company's capacity was 460,000 net tons and in 1911 it was 720,000 net tons.

Mr. Lindabury read from the Government's bill of complaint charging that in 1900, when the American Bridge Company was formed, it exercised a monopoly of the bridge business of the country, and asked if such was the case. Mr. Davis replied that the company never monopolized the bridge business. He named numerous bridge companies which did business in 1900, some of whom have gone out of business since then and many are still in operation.

The Testing Society's 16th Annual Meeting

Presidential Address by Robert W. Hunt on the Application of Specifications— An Illustration Found in Rail Rejections

The first session of the sixteenth annual meeting of the American Society for Testing Materials at Atlantic City, N. J., opened under very favorable auspices as to attendance and enthusiasm. The society was called to order by its president, Capt. Robert W. Hunt, in the Hotel Traymore at 11 a. m. Tuesday, June 24. Nearly 200 members were present and it is estimated that at least 500 will attend part or all of the remaining nine regular sessions.

A Year of Prosperity

The report of the executive committee congratulated the convention on the success of the Sixth Congress of the International Association for Testing Materials, held last September in New York and called attention to the fact that of the 153 contributions presented then, 38 came from American sources. The proceedings of this important Congress, published in German, French and English, were promised for early delivery. The present membership was reported as 1574, a net gain of 144 since the last annual meeting in March, 1912. This is at the rate of 115 per year as against 100 per year for the previous six years, the doubling of the dues in August, 1910, evidently having had no detrimental effect. The esteem in which the society is held is reflected in the sale of its publications, the income from this source being $2,524.47 as compared with $982.82, announced in the last annual report. The cash balance on June 1, 1913, was reported as $9,444.39. The society's excellent financial condition has made it possible this year to preprint the committee reports and the papers and to distribute them generally before their presentation at the convention. This is the first time this has been possible on an extensive scale. The creation of four new committees was authorized by the executive committee, including one on electrical standards and one on papers, the creation of the latter rendering it possible to do away with the former standing advisory committees on iron and steel, cast iron, preservative coatings, etc.

The report of the committee on standard specifications for coal, J. A. Holmes, chairman, as presented by the secretary of the committee, G. S. Pope, was to the effect that after a considerable amount of work it was concluded that present knowledge of the subject is inadequate for formulating a satisfactory specification for coal, except that for steaming and power plant purposes. On this subject considerable detail work remained and therefore the committee recommended that it be continued for another year.

The new committee on papers, Edgar Marburg, chairman, presented its first report. The authority conferred upon it by the executive committee embraces the acceptance of all papers, the co-operation in an advisory capacity with the secretary in preparing a technical programme for each meeting, and the formulation of its own rules, subject to the approval of the executive committee. The efforts of this committee to have preprinted and distributed as many reports and papers as possible resulted as follows: Of the 22 committee reports and 37 papers included in the programme for this meeting, 19 of the former and 33 of the latter were distributed from two to four weeks previous to the assembling of the meeting. This leaves only 7 out of a total of 59 not accounted for. A set of rules governing papers, committee reports and discussions was announced.

New Officers

Ballots were canvassed for the election of officers and the following were declared chosen:

President—Arthur N. Talbot.

Second Vice-President—Richard Moldenke.

Membership on the Executive Committee—William H. Bixby, John Brunner, F. H. Clark and Albert Sauveur.

President-elect Talbot is professor of municipal and sanitary engineering in the University of Illinois, Urbana, Ill. He has made a number of important contributions to the Proceedings of the society.

Wednesday was devoted to iron and steel, there being morning and evening sessions, while Wednesday afternoon was reserved for recreation. Cement and concrete sessions were scheduled for Thursday; ceramics and road materials for Friday morning and non-ferrous metals for Friday afternoon. The final session, Saturday morning, will be given to papers on testing and miscellaneous subjects.

Address of President Hunt

The annual address was given Tuesday evening by the president, Robert W. Hunt. It dealt with the "Application of Specifications" and was as follows:

"The past year was made a notable one in the history of our society by our having acted as hosts to the International Association for Testing Materials on the occasion of that organization's Sixth Congress. Having that Congress held in this country was an ardent desire of our late honored and loved president, Dr. Dudley. I am sure that many of you will recall how earnestly he advocated such an invitation being extended by this society, and how gratified he was by its action empowering him as its president to deliver such a message to the association's council when he attended the Copenhagen Congress, and with how much evident pleasure he announced to us that the invitation had been accepted; apparently, through his always great modesty, not at all realizing the important part which his charming personality had played in influencing the acceptance.

Success of the 1912 Congress

"Dr. Dudley's mind was full of plans for making the American Congress a success, and it was a great pity that he was not spared to participate in the event, toward the happening of which he had done so much. We who were

here tried to be worthy of the trust left to us, and, thanks to the generous support of many of our society's friends, and the self-sacrificing work of your several committees, to whom the work was intrusted, I am certain that the Congress and all pertaining to it passed off in a manner which would have been to Dr. Dudley's satisfaction, and which was gratifying to our visitors, as they have both personally and officially assured us.

"On behalf of the American Society for Testing Materials, I take this occasion to thank most heartily the various industrial organizations and individuals who so generously contributed money for the occasion, and also those who added so much to the pleasure and profit of our foreign visitors by giving them the privilege of visiting their various establishments, in many instances also extending to them gracious hospitality. We had the satisfaction of returning to our money contributors a very respectable percentage of their donations. To the others we can only give appreciative thanks.

"I also desire officially to thank the members of the various committees who had the detail work of the entertainment of our visitors and the operations of the Congress, for their labors, and to congratulate them upon the great successes accomplished. I am certain that in every way the holding of the Congress in this country was of value and did much to benefit our society. The bringing together of so many men of high scientific attainments and practical experience in widely separated fields, and not only enabling them to exchange professional ideas, but also to become personally acquainted, was certain to result in good, and their presence in this country attracted the attention of its men of affairs and did much to impress them with a greater appreciation of the value of our own society on not only what may be called the technical side of the matters with which it is identified, but also the absolutely practical side—the money value—of our deliberations and conclusions.

The Beginnings of Specifications

"In the not distant past there was a more or less general feeling among the manufacturers of this country that specifications covering their products were entirely unnecessary. If it amused a customer to formulate such things and present them as describing that which he desired to purchase, well and good, but that the products should actually conform to the details of what they considered purely academic requirements was a different proposition. They had been for years engaged in their several occupations and naturally knew more about them than was possible for any outsider. In a way, this was true, but the element of progression was involved, with the result that what had been equal to, and therefore satisfactory under, the requirements of yesterday became inadequate to the demands of to-day. The situation could be best met by accurate observations of the behavior of materials of known composition under carefully observed conditions and measured stresses, and it is patent that without complete knowledge of observed materials the obtained results would be so obscured that accurate deductions would be impossible. In many cases the conditions under which materials are to be used are so widely different that what would be satisfactory in one case would be very unsatisfactory in another.

"With the progress of affairs, and in fact as part of such progress, has come the organization of technical societies. They have played and are filling an important part in the world's scientific and material advancement. The societies dealing with production and application of materials and power have brought together the brightest minds and most enterprising of the world's workers, who, more quickly and more thoroughly than would have been in any other way possible, have found that no matter how smart each man might be and how much he might know, it would not be all, and that through comparing notes and so exchanging knowledge with his fellows, he was certain ultimately to receive at least as much as he gave. That such is true is now accepted, and the day of closed shops and self-sufficiency has forever passed. With this has also come the day of specifications, but, as yet, let them be drawn ever so carefully, and based on the most careful observation, they cannot entirely take the place of and make unnecessary the exercise of initiative on the part of the producer. Specifications have to be not only adapted to the conditions under which the materials are to be used, but they also have to be intelligently applied to the production of the materials they are intended to cover. They must be kept practical. There is no question that steel absolutely without any phosphorus in its composition would be most desirable, but, so long as such metal is practically unattainable, why specify it? And knowing that the available iron ores of a country are best adapted to certain processes, it would seem unwise to expect its engineers to adopt specifications which would leave their own people out of the running.

The Question of International Specifications

"It is thought by many that one of the most desirable results of the International Association for Testing Materials and its Congresses will be the adoption of International Specifications. It is only in a somewhat restricted degree that I concur in that view. I think that for many years to come most countries will demand specifications which will best apply to their own circumstances, either of production or use or both. While, for instance, Germany is a large and successful producer of basic Bessemer steel, it has been proved by two costly failures that the ores of the United States are not adapted to the economical production of such steel; therefore this country cannot be expected to have much interest in international basic Bessemer steel specifications. Still, adhering to my own shop, it is patent that so long as European railroads have their present light equipment and short lines, they will not require the same character of rails as our American roads; nor do they need the same details for their equipment. There are many other instances in which different countries will, for their own use, require different specifications, no matter where the products may be made. But there is one international field on which all countries can unite, and that is in the studying and discussion of scientific investigations and the details of the testing of materials, and on the results thus obtained and mutually discussed valuable specifications can be based. To be of value they cannot be purely academic, and bringing into personal contact the scientist and the intelligent practitioner is certain to result in real progress.

The Spirit Rather than the Letter of Specifications

"As already stated, no matter how carefully specifications may be formulated, they cannot eliminate the necessity for judgment being exercised in their application. Unusual conditions may, and frequently do, arise, and of such character that it would have been practically impossible to provide for them in the specifications. Probably as much attention has been given in this country to specifications for steel rails as for any other product. Three of the national technical societies have had able committees upon the subject, and it has received at their hands years of careful investigation and consideration. The present Rail Committee of the American Engineering Association is composed of some of the ablest railroad engineers of this country, and they have had placed at their command facilities for observation and money for experiment, and the steel rail specifications approved by them are generally accepted by the American railroad world as being *ex cathedra;* but that they, if blindly followed, will not insure satisfactory products has lately been most strikingly illustrated. Their specifications provide that if, under certain conditions, the drop test piece which is to be taken from the top end of the top rail of the ingot fails, all of the top rails from that heat shall be rejected, and a second test shall then be made of a test piece cut from the top end of any second rail of the same heat; and if that piece fails, all the second rails of the heat shall be also rejected, and a third test made from a top piece taken from any third rail of the heat; and if it also fails, all the remainder of the rails made from that heat shall be rejected.

"It occurred lately that on an order for rails under the above named specifications, a large percentage of the top rails failed, about 22 per cent., and about 20 per cent. of the test pieces from the second rails of those same heats also failed, and about 40 per cent. of the third rails tested from that 20 per cent. also failed, and therefore the entire heats represented by these last rails were condemned. The chemistry of all of the steel was clearly within the specifications, and, under a strict interpretation

of them, only the top rails of the failed heats plus the second rails of heats whose second rails also failed, plus the entire heats represented by the failed third rails, would have been rejected. But with steel giving such a heavy percentage of unsatisfactory results, and realizing that at best the tested pieces were but a small proportion of all the metal represented, it was decided not to ship any of the rails which had been rolled on the order; which, in my judgment, was a wise non-adherence to the letter of the specifications. But such instances do not at all prove that specifications are without value. They afford an available means of formulating the most advanced state of the art, and, if drawn according to the best judgment of men familiar with the practical workings of that art, they will be to the highest interest of both producer and user.

"As evidenced by the reports of our society's several committees, they have been active since our last meeting upon the various subjects coming under their several jurisdictions, and their reports and recommended specifications which are before the society for consideration give positive proof of the vast amount of labor and careful thought which have been given them. It is especially true of our organization that our committees are the vital element in its life, and I take great pleasure and pride in the feeling that at no time in the society's history has its whole membership been more keenly interested in its work.

"It was my fortune to follow in office most distinguished and able men, and it is a great satisfaction to know that I am to welcome as my successor a gentleman who has accomplished so much in engineering investigation, and whose fame as an authority on his chosen lines is world wide. And I congratulate you, my fellow members, that our society enters upon another year in such a prosperous condition, and with so bright an outlook for the future."

Youngstown's Growth in Iron and Steel

With the title "Youngstown, the City of Progress," the Youngstown, Ohio, Chamber of Commerce has published a flat book of about 100 pages, setting out in a most attractive and impressive way the extent and diversity of the city's industries. There are views of steel works, blast furnaces, banks, office buildings and residences, and the text gives a deal of information about the different manufacturing establishments. Board of trade and chamber of commerce statistics have come to be pretty well stereotyped, but the compilers of this book have made a departure. Youngstown has been commonly thought of as purely an iron city, but evidently there has been much diversification in the past dozen years. From 44,885 in 1900 the population grew to 79,066 in 1910. The figures for the steel industry are not assigned to any particular year, but probably apply to 1912. They show an inbound movement of 6,000,000 tons of coal, 10,650,000 tons of iron ore, 3,192,736 tons of coke and 1,600,000 tons of limestone. The outbound movement is 5,000,000 tons of finished product. J. G. Butler, Jr., is president of the chamber of commerce and iron and steel companies are well represented on the board of trustees.

Shop Trips by Superintendents and Foremen.—The Superintendents' & Foremen's Club, Cleveland, Ohio, recently decided to make inspection trips through various metal working plants in that city, the members believing that the time thus spent would yield a good return in features of interest they would see and in information gained. The first trip was recently made to the plant of the National-Acme Mfg. Company. The second took place June 25, when a visit was paid to the plant of the Chandler & Price Company, manufacturer of printing presses. It is planned to have these shop excursions about every two weeks. At a meeting of the club June 28, M. Beck of the Ferro Machine & Foundry Company will give an illustrated lecture on gas engines. A buffet luncheon will be served.

An ingot, said to be the largest in the world, and weighing 150 tons, was recently cast at the Grimesthorpe Works of Cammell, Laird & Co., Ltd., Sheffield, England. It is 24 ft. long, 7 ft. 1 in. mean diameter over flats and 7 ft. 6 in. mean diameter over corners. It is acid open-hearth steel and destined for special admiralty purposes.

Pittsburgh and Vicinity Business Notes

The blast furnace of the Stewart Iron Company, Sharon, Pa., has been relined and repaired, and will probably be blown in this week. The company had trouble with the furnace during the spring floods and was compelled to blow it out. It will make low phosphorus Bessemer iron.

The Aluminum Company of America, Pittsburgh, has placed an order with the Euclid Crane & Hoist Company, Cleveland, Ohio, for a 2-ton electric traveling crane, to be placed in its New Kensington, Pa., works. A contract for electrical controlling apparatus for this installation and for two 5-ton and six 6-ton cranes recently purchased from the Alliance Machine Company has been placed with the Electric Controller & Mfg. Company, Cleveland, through its Pittsburgh office.

The Standard Bridge Tool Company, Pittsburgh, states that the District Court of the United States for the Western District of Pennsylvania has rendered a decision affirming that the Thomas spacing table is not an infringement of the Conley patents covering separately adjustable stop spacing tables. The company has recently taken orders for the building and installation of Thomas automatic spacing tables for the Harlan & Hollingsworth Corporation, Wilmington, Del.; Pressed Steel Car Company, Pittsburgh, and the Pennsylvania Railroad Company, for a second installation in its Altoona car shops.

On Thursday, June 26, officials of the Republic Iron & Steel Company will meet in Pittsburgh the wage committee of the Amalgamated Association in an endeavor to arrange a schedule for the puddling and finishing mills. As an agreement was reached recently between the Western Bar Iron Association and the Amalgamated Association, this is taken to indicate that the Republic Company will also agree to sign the same scales.

The National Malleable Castings Company, Sharon, Pa., was negotiating for the purchase of the plant of the Sharon Boiler Works prior to its being bought by the Knox Pressed & Welded Steel Company, and now has plans under way for making a large addition to its Sharon plant.

The report that the American Sheet & Tin Plate Company will build five hot tin mills, four cold mills and several annealing furnaces at its works at Chester, W. Va., is untrue. Nothing is being done at that plant at present beyond some ordinary repairs.

The Wheeling Mold & Foundry Company, Wheeling, W. Va., has secured from the General Electric Company a contract for all the steel castings entering into the construction of the 44 electric locomotives which will propel vessels through the Panama Canal locks. This will about complete the work of the Wheeling company for that canal, which included gate valves, valve frames, all operating mechanism for these valves as well as the cylindrical valve machinery, mitre gate moving machines and the machines for operating the main gates, together with the mitre gate forcing machines for locking the gates when closed. The company is also building the operating mechanism for the dry dock locks at Balboa. The total work amounts to about $3,500,000.

The Westinghouse Air Brake Company, Wilmerding, Pa., has notified its employees that belong to the Westinghouse Air Brake Veteran Employees' Association that it will give each a 10-day vacation this year with full pay. All members of this association have been continuously in the employ of the company for 21 years or more, there being 36 who have been retired on pensions at the age of 70 or over. The order for these vacations is the result of the desire of George Westinghouse, head of the industries which bear his name, to remember in some way the faithful workers who have been with him a long time.

The Riter-Conley Mfg. Company, Pittsburgh, has received an order from the Carbon Steel Company for two 50-ton ladles, an order to ship 64 transmission towers to Brazil and a contract from the American Water Works & Guarantee Company of Pittsburgh for 30 tainter gates which will require about 300 tons of plates.

In the article describing the plant of the Packard Motor Car Company, which appeared in *The Iron Age* of June 5, the molding machine illustrated on page 1353 is one of five installed in this plant by the International Molding Machine Company of Chicago.

Influence Affecting Engineering Practice*

Some of the Factors Controlling the Development of Transportation Facilities, Mining and Manufacturing in America

BY W. F. M. GOSS†

Engineering practice is an outgrowth of a people's resources, experience, necessities and desires. These are matters which, as attributes of American life, have been subject to constant and rapid change. The founders of our nation came to a continent which was new, not merely by virtue of its recent discovery, but because its natural resources were fresh and untouched. Into the midst of these resources came the representatives of civilized society until by immigration and by natural increase a nation was developed.

The pioneer was necessarily an agriculturist, but as people multiplied, the desire for trade appeared. Roads were constructed and other means of transportation were introduced. Men gradually drew upon distant localities for portions of their support, luxuries became necessities, until today no one in the United States is so poor that he is limited in what he has to that which he himself is able to produce. Occupations other than agriculture have arisen, farmers have ceased to be self-supporting, and men in increasing numbers have turned their attention to the engineering industries. In the United States as elsewhere, the percentage of the total population engaged in trade, manufacturing, mining and transportation has increased, and the percentage engaged in agriculture has diminished. The significant characteristic of this change in the United States is the rate at which it has proceeded. For several decades one-half of one per cent. of the whole population has every year moved from country to city.

These changes have attended the growth of the country's engineering activities. They suggest the presence of complex problems touching the social and economic welfare of the people of the country, some aspects of which have been discussed. It is probably not true, as some have assumed, that the transfer from agriculture to other pursuits has proceeded because men have especially wished to leave the farm, but rather because all classes of people, including farmers, have felt the need of transportation, of elements, and of conveniences in many different farms which can be supplied only by non-farm labor; and because the country's wealth of natural resources has placed at the disposal, both of purchaser and producer, the means whereby the need could be satisfied.

The Engineer's Opportunity

The process of supplying these needs has constituted the engineer's opportunity. His work in all its various aspects is to be looked upon as a response to a demand. One result of the very great demand for manufactured articles has been the exaltation of the machine. The high cost of labor also has stimulated its introduction. The general purpose machine has steadily given way to machines designed to perform specific operations. The engine lathe, which was formerly a dominant figure in most metal working establishments, and which is still useful in general repair work, is now regarded as an expensive tool for specific manufacturing purposes.

From their early application to the making of screws and other small devices, automatic machines are now used to produce metal parts of almost any size or shape, the controlling factor being the number of parts required. The hollow spindle turret lathe produces machine parts of comparatively large diameter from rod stock. A special form of lathe carrying gangs of cutters accurately set on an elongated carriage produces machine spindles in single or double lengths in one-tenth the time which would be required to do the same work on an engine lathe.

Hand-operated turret lathes designed for chuck work are used in large numbers for finishing castings, forgings and steel blocks of all sizes and shapes. Such machines are now supplied with chasing tools which can be used in producing screw threads in connection with the operation of boring and facing without the necessity of moving the work in the chuck. This addition, which insures accuracy of thread in its relation to other parts, has brought to the turret lathe a class of work which formerly has been accomplished on the engine lathe.

The recent introduction also of the double-spindle turret, which, except in the single matter of placing the work in the machine, permits two pieces to be worked upon at the same time with no greater effort on the part of the operator than is required when but one piece is dealt with, has contributed to the rapidity with which work is done. For example, by the use of such a machine cast-iron blanks for spur gear wheels, 8 in. in diameter and 1½ in. wide are finished on one side, bored and faced, each of three surfaces receiving two cuts, at the rate of two pieces every 5 min.

The Use of Special Machinery

The extensive use of special machinery in any manufacturing industry imposes heavy responsibilities upon its engineering staff. A definition of the article to be manufactured precedes the installation of equipment. The various steps to be taken in fabricating the article are reduced to the smallest practicable number, are made as direct as possible, and proceed in a predetermined order. These factors having been determined, the machines to be employed are selected, or if not available are designed and constructed. When in due time the establishment begins its operations, the part which each operator is to perform will have been defined. The development of these matters is for the most part a task for the engineer, and one result which has attended the extensive use of special machinery in the manufacturing industries of the United States, is to be seen in the numerical growth and in the increased technical strength of their engineering staffs.

The importance attaching to the machine as a factor in industrial production has emphasized the necessity of maintaining equipment in a high state of efficiency. This condition is not satisfied merely by keeping individual machines in good repair. It implies that the whole factory embracing an aggregation of individual machines shall work together as harmoniously and effectively as the state of the art will permit. An existing machine or group of such machines even when too new to be in need of repair should sometimes be thrown out as no longer serviceable to make room for those of higher efficiency or greater capacity. The question is not whether the old machine is good, but what may be accomplished in improving the quality or in reducing the cost of work by putting a new machine in its place.

If the manufacturers of the United States have been more ready than the people of other countries to proceed with such changes, they have had a greater incentive for so doing in the higher price of their labor, for the higher the cost of labor, the greater the amount of capital which may be spent in replacing existing machines or installing new machines for the purpose of reducing labor costs. Other factors also have an influence. For example, a company manufacturing heavy machinery reports that the capacity of an important department of one of its plants has been more than doubled in the past few years merely by changing machines, old machines having from time to time been taken out and new and more powerful ones substituted. The total number of machines in the re-equipped department is the same as before, the floor space is practically unchanged, and there has been no extra cost for buildings. The change, however, has lowered the labor cost per unit of production, while the scale of wages

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paid the workmen has been increased. The results have more than justified the expenditure of capital, not only for the new machines, but also for the increased power required to drive them.

Solving the Problems of Combinations

In the development of American engineering industries, there has ever been a tendency to combine undertakings. The extent to which this movement has been carried is to be seen in the fact that in most departments of engineering endeavor, in transportation, in mining, and in manufacturing, the effort of the country chiefly finds expression in corporation management. In the operation of a large corporation, the number of similar processes to be performed by a single factory has increased, the subdivision of operations has been extended, and the way has been opened for a more extensive use of special machinery. As a result, the cost per unit production of plant, of power to drive the plant, and of labor to operate it, has generally been reduced. Lower manufacturing costs have been supplemented by gains in other directions, as, for example, in the purchase of materials and the extension of sales into new fields. By-products and wastes which are necessarily neglected in a small establishment are of sufficient importance in the operations of a great corporation to justify the introduction of means for their utilization.

The working out of the technical problems of the corporations and the upbuilding of the manufacturing and public-service plants are matters which have received the attention of the most distinguished engineers of our own and other countries. The corporations have found it comparatively easy to secure capital. By their command of superior scientific and technical leadership, they have improved methods and reduced costs of manufacture, they have developed new lines of industrial activity and in these and in other directions, they have generally met the public need promptly, economically, and efficiently.

The great manufacturing corporations have usually subdivided the whole undertaking into manufacturing divisions, each one of which is made more or less complete. Such an arrangement works out well where there is a great diversity of product and where the manufacturing facilities must vary for different types of product.

The advantages are manifest. With a superintendent in charge of the complete production of a single line of manufactured articles, responsibility is readily fixed. By giving such a superintendent all the facilities necessary to the work for which he is held responsible instead of making him dependent upon so-called "feeder sections," he will ordinarily develop a better performance. Under this arrangement, it is easier to determine accurately the cost of production. Again, the method of paying for labor may be subject to advantageous change under different conditions of manufacture. An establishment having large experience in such matters has found that in the manufacture of heavy machinery where a single operation requires the use of a machine tool for several days, the premium system of compensating labor works out well, while this plan is not at all satisfactory as applied to small work where the pieces are completed in a very few minutes' time. In this smaller work a modification of the piecework system or some form of bonus is reported as proving most satisfactory.

The determination of the number of self-contained subdivisions is much involved with the magnitude of the manufacturing operations. The fact seems to be that in a smaller plant the economies of administration are increased through centralization, while in a large plant the same results are obtained through division.

Scientific Management

Among the significant movements which have affected recent engineering practice in the United States, is the campaign for higher efficiency in operation, best known as "scientific management." Much has been said and written concerning this subject, and many prophets have arisen, some of whom have not spoken with inspired tongues, but out of much talk and action have come results which are quite worth while.

Scientific management assumes that there is one best way for doing everything; that if practice is diverse, it is because all factors affecting it are not known; and that "the best management is true science resting upon clearly defined laws, rules, and principles as a foundation."

The development of scientific management involves, first, the discovery, and, second, the application of the laws, rules, and principles which control each particular problem. In its application to industrial efficiency, scientific management has first sought to prevent loss. It has shown the importance of studying with the greatest attention to details the routing of materials through a manufacturing establishment in order that there may be as little handling as possible and that points of congestion in the movement may be avoided; that machines be so located as to aid in the orderly movement of the materials they are to work upon; and that the action of every machine be made as effective as possible.

Improvements in the quality of steel used as cutting tools, and the determination of the most effective combination of cutting speed and feed, while matters of detail, are nevertheless of very great significance in the operation of a large establishment; consequently, values once determined by scientific methods are thereafter prescribed and are no longer subject to the individual judgment of the workman. Provision is made whereby cutting tools may be kept in perfect order and despatched from the toolroom to the machine where they are needed at the time when they are needed.

Finally, after all has been done to relieve the workman of details which take time without contributing to his output, his own movements are made subject of careful study. In its application to the individual workman, scientific management begins with the careful selection of the man for the task. Applicants for positions are examined that the unfit may be rejected and that the precise nature of the work to which the accepted individuals are best adapted may be determined. The selected man is then trained in the performance of his task. His pay is increased as the value of his product increases.

The effect of scientific management upon the workman himself appears to be entirely satisfactory. His wage has often increased to limits never before reached by artisan or laborer and he is a contented as well as an effective workman. Its effect upon the industry also is favorable, since whatever increases the output of the individual workman tends to increase the earning capacity of the plant.

Caring for the Workingman

As an accompaniment to a very general movement in America for increasing the working capacity of laborers, has come also an effort to better their environment. Of the many different forms in which this movement finds expression, one of the most important is that which is designed for the better protection of human life in industrial establishments. In the pioneer days of American manufacturing, little attention was given to the safety of men, but a vast improvement has been brought about in the past few years. Projecting set screws in collars and pulleys on revolving shafts, exposed machine gearing and unprotected elevator openings which formerly were common sources of danger have entirely disappeared and careful studies are being made of every possible source of hazard, with a view to its abolition. The legend "safety first," is beginning to mark every industrial enterprise.

Again, the principle that a man to do his best at work must be in good physical condition, is receiving recognition. The man of whom much is expected must have rest and proper food. The home life of the workman, therefore, becomes an important factor in the efficiency of the industry. Larger industries have inaugurated departments of social service for the purpose of studying conditions and instituting reforms in the factory and in the homes of the workmen. The unsightly and untidy surroundings of the American factory are rapidly giving way to grounds which are made beautiful by the art of the landscape gardener, and the buildings are showing a higher architectural quality, and a larger provision for the comfort and convenience of the workman.

In many of these matters American industries have in the past been shamefully negligent, and it is interesting, though perhaps not entirely creditable, that attention should now be given them chiefly as an outgrowth for a campaign for increased industrial efficiency. In the development of this aspect of scientific management, America is finding much to emulate in German practice.

The Effect of Education

The activities of the American engineer have been supplemented and greatly stimulated by the influence of various educational processes, important among which are many semi-scientific and semi-technical organizations which enroll large numbers of members, hold meetings, or conventions, at fixed times, and publish the proceedings of these meetings for the benefit not only of the members, but of any one who may be interested. I have before me an announcement of coming conventions of interest to railway men, which gives the time of meeting of 77 different organizations, each of which exerts an important educational influence. To indicate their character, I give the names of ten, selected more or less at random, as follows: Air Brake Association, American Association of Freight Agents, American Wood Preservers Association, Master Boiler Makers' Association, Central Railway Club, New York Railway Club, National Railway Appliances Association, Railway Gardening Association, Railway Store-Keepers' Association and Railway Signal Association. Wherever men's work causes them to fall into groups, they are likely to have their organization and their organization's publication.

In addition to the publications of organizations, there are the high grade technical magazines or journals, and above these are the published proceedings or the more strictly scientific and engineering societies. Taken altogether, they furnish an educational influence of tremendous import. The wise industrial manager encourages all who are responsible to him to read and he also reads. The result is a free and altogether helpful interchange of experiences and opinions. Trade secrets are practically unknown. What one man gains another may have. In manual arts, in science and in engineering, the practice of the country is an open book.

Finally, standing high among the educational factors which are influential in the development of American industries, must be mentioned the university and the technical school. As compared with those of Germany, the American technical school has been a plant of slow growth. For the first few decades of their existence, they received but little encouragement from the professions they aimed to serve. Those who controlled the engineering activities of the seventies were men of action. They were often without academic experience. In recruiting their staff they were likely to demand skill in manipulation, physical strength and industry. They were ordinarily not inclined to make scientific attainment an important qualification.

Under these conditions, the American technical schools, especially those of the state universities, found it important that graduates in civil engineering should be well trained in the handling of field instruments and in the art of drafting; and that the graduates in mechanical engineering should be skilled in the use of tools and in the actual operation of machinery. It was chiefly through the exercises of such accomplishments that they later secured a foothold in their chosen profession.

The technical schools, therefore, in the beginning emphasized the more practical aspects of engineering, leaving the matters of mathematical theory for a later time. From such simple beginnings the schools have made steady progress, and today the whole situation is changed. Now, leaders in field and factory are generally college-trained men, and they are prepared to make use of men trained in the more highly theoretical aspects of their work. The articulation in the management of engineering enterprises, also, required a quality in leadership which under the simpler administration of former years was not needed.

The result is that today there is nowhere in America a keener appreciation of the service which such sciences as mathematics, physics, chemistry and biology can render engineering than in the technical school. The schools are revising courses of study and they are emphasizing the fundamental methods and facts of science rather than the more easily acquired practical aspects of engineering.

Many of them, following the example so effectively set forth by the German Hoch Schule, are making contributions to engineering research, and their outlook toward science as a basis for all technical development constitutes one of the most promising aspects of our educational work. There are now in the United States 73 different institutions of collegiate grade having more than 100 students in engineering courses, with a total student enrolment in such courses of 31,500. Two-thirds of this number are registered in civil, mechanical and electrical engineering. The bond between the industries and the schools, which in earlier days was uncertain, has in recent years been tremendously strengthened. The industries are now looking to the schools for the men who are to be their leaders; for facts which will be serviceable in the promotion and development of their business, and for the stimulus which is to transform present-day practice into the more perfect procedures which our ideals demand.

Pittsburgh's Remarkable Freight Movement

The Chamber of Commerce of Pittsburgh, through its traffic department, has just issued its annual report showing that the Pittsburgh district in the matter of in and out bound traffic is still the premier city of the world. The figures show that in 1912 the shipments into Pittsburgh for consumption and its out bound manufactured products amounted to 164,594,915 tons for the railroads and 12,476,323 tons for the rivers, or a total of 177,071,238 tons—more than double the combined tonnage of Liverpool, London, and New York. These figures do not include freight passing through Pittsburgh and routed for points outside that city. The freight traffic of Pittsburgh has about doubled in 10 years and has more than quadrupled in 15 years. As a matter of interest, we print below the figures of the Pittsburgh district as just issued by the Chamber of Commerce for the years 1897 to 1912 inclusive:

	Railroad, tons	River, tons	Total, tons
1897	36,679,415	7,318,366	43,997,781
1898	39,387,925	7,407,243	46,795,168
1899	49,475,211	9,181,486	58,656,697
1900	57,005,465	8,813,166	65,818,631
1901	64,125,000	9,100,000	73,225,000
1902	78,950,000	10,900,000	89,850,000
1903	79,750,000	10,673,394	90,423,394
1904	77,750,000	8,209,356	85,959,356
1905	92,000,000	11,023,928	103,023,928
1906	113,000,000	9,000,000	122,000,000
1907	146,798,351	14,395,816	161,194,167
1908	104,500,508	11,454,895	115,955,403
1909	145,580,388	12,426,154	158,006,542
1910	156,301,531	11,431,737	167,733,268
1911	152,073,897	12,519,776	164,593,673
1912	164,594,915	12,476,323	177,071,238

It would be interesting to know how much of the above enormous tonnage is iron and steel in their various forms, but the figures on shipments furnished by the Pittsburgh manufacturers and the railroads are absolutely private, and not even estimates can be made. It is known, however, that considerably more than 75 per cent. of the freight tonnage of the city is contributed to the railroads and the rivers by its manufacturers. The statements made and widely circulated a few years ago, that Pittsburgh was losing its prestige as a manufacturing center, seem to be refuted by the above astonishing figures.

The Interstate Commerce Commission has ordered present rates on pig iron from producing points in Virginia to Pennsylvania and New Jersey points continued, refusing to approve a proposed increase, notice of which was given some time ago by the Pennsylvania, Chesapeake & Ohio and other railroads. The commission holds that the carriers failed to justify the reasonableness of the proposed advances, which were from 10 cents a ton on shipments to Bridgeton, N. J., to 45 cents to Hainesport, N. J. The rate to Philadelphia was proposed to be advanced from $2.80 to $3.

The Steel and Metal Digest for June publishes in full the testimony of President James A. Farrell on direct examination in the Government suit for the dissolution of the United States Steel Corporation. It covers nine sessions of the hearing and contains, roundly, 110,000 words —a monumental document of contemporaneous iron and steel history.

The Otis Steel Company, Cleveland, Ohio, has placed an order with the Alliance Machine Company, Alliance, Ohio, for nine cranes for its new plate mill. The order includes one 50-ton, one 40-ton, and the others in 25-, 15- and 5-ton sizes.

The Machinery Markets

With one or two exceptions, new business is quiet in all machinery distributing centers. In manufacturing districts, the volume of output is slowly becoming smaller, but shops are still running on a fairly satisfactory basis. The New York market is quiet with a tendency to halt because of pending matters of legislation, but some good business is in prospect. Special mchinery is in fair demand in Philadelphia, but trade generally is slow and scattered. Average production is reduced somewhat in New England, but this is partly due to the season and business is on the whole good. New orders are scarce in Cincinnati and a disposition to await tariff changes is noticeable, although the export trade has livened up. Small orders have continued steady in Detroit, although new inquiries are slow and no large propositions are in sight. In Cleveland new orders are light, but steady and the output is being maintained. Milwaukee shops are keeping busy, but with lighter orders coming in are catching up with deliveries. Railroad buying is slow and miscellaneous inquiry is light, but steady, in Chicago. In Birmingham trade is good and the settlement of building trades strikes and the continuance of large mining operations is promising for the future. St. Louis reports a fair activity in small lots of new machine tools and in second hand machinery, but no large business is expected until the tariff question is settled. In Texas machinery and tool trade conditions are good and much reliance is being placed upon continued good crop conditions for activity in the future. Machine tools are selling quietly on the Pacific coast; miscellaneous machinery is having a steady sale and both railroad and Government business of large proportions are expected before long.

New York

NEW YORK, June 25, 1913.

The market has continued quiet and otherwise without notable change. The trade still awaits the purchasing of machine tools which were recently specified by the Delaware, Lackawanna & Western Railroad, this prospect being the most interesting one in the local market. The Pennsylvania has practically completed buying against the requirements made known in the last few weeks. In the matter of navy yard business local dealers did fairly well when bids were opened June 3 and 10. The machine tool exhibit which closed at Atlantic City last week will lead to a few sales if the expectations of some of the exhibitors are realized, as several prospects were disclosed. There are coming to light a few isolated cases where purchases have been deferred until the tariff and currency questions are settled.

A building permit has been issued to F. L. Schmidt & Co., engineers and designers of cement factories, etc., for the erection of a machine shop and laboratory on a site it recently purchased at Elizabeth, N. J., located east of Meadow avenue, between North avenue and Fanny street. The new plant is to take the place of the one now in Jersey City, and the building for which the permit was issued will cost $24,000. It will be of steel construction and work is to be started at once. The company states that it probably will not require any new machinery, as the equipment now in Jersey City will be used. The plant will be operated by electric power, probably supplied by the Public Service Corporation. The company manufactures a varied line of grinding and pulverizing machinery.

The Babcock Mfg. Company, Leonardsville, N. Y., whose agricultural implement factory was destroyed by fire recently, will soon be in the market for a complete line of machinery, including lathes, planers, shapers, milling machines, keyseaters, drill presses, punching and shearing presses, bulldozers, shears, cylinder planer, bandsaw, wood boring machines, wood shaper, wood molding machine, buzz saw table, crosscut saw, 75-hp. dynamos and several electric motors. The company expects to be ready for the installation of machinery about September 1. The company wishes to receive catalogues, but announces that it will not entertain any proposition before the middle of July.

The C. Roberts Rubber Company, 202-214 New street, Newark, N. J., has begun the construction of an addition to its plant 50 x 100 ft., four stories and mill construction, at an estimated cost of $27,000. The new building is to be used for offices and warehouse purposes.

The Prest-O-Lite Company, Long Island City, N. Y., is enlarging its plant by the erection of a two-story factory building 18 x 22 ft. at an estimated cost of $2000.

The Radley Steel Construction Company, Eighteenth street and the East River, New York, has leased the property formerly occupied by the Ravitch Iron Company, Long Island City, and will remove its plant there within the next few weeks.

A new brass foundry and a reinforced concrete extension to its factory building are being added to the plant of the Consolidated Car Heating Company, Albany, N. Y.

J. S. Gibson, clerk of the commissioners, Newark, N. J., will receive bids until July 1 for three centrifugal pumping engines.

W. Thomas, city engineer and architect, 447 Franklin street, Schenectady, N. Y., will receive bids until July 2 for furnishing and supervising the installation of sewage pumping machinery and appurtenances.

The Silver Alloys Corporation, Lynbrook, N. Y., has been incorporated to manufacture and deal in metals, alloys, etc. The incorporators are C. Wharton, J. F. Wiggin, of New York City, and S. H. Mills, Newark, N. J.

The Binghamton Iron & Metal Company, Binghamton, N. Y., recently organized, has taken over the plant and business of the Binghamton Metal & Paper Company. Considerable new machinery will be installed.

Articles of incorporation have been granted to the American Ferrolectride Corporation, Plattsburgh, N. Y., with $100,000 capital stock, to manufacture and deal in metals, chemicals, etc. A. H. Boardman, J. D. Herriman, New York City, and C. W. Standbury, East Orange, N. J., are the directors. Arrangements are being made for a manufacturing plant.

Plans are being completed for a factory 54 x 118 ft., two stories, to be erected on Broad street, Utica, N. Y., by J. A. Birsching, manufacturer of textile machinery.

The King Factory Corporation, Kingston, N. Y., has had plans completed for a factory building 50 x 130 ft., for which bids are now being taken.

The factory to be built at Buchanan, N. Y., by the Standard Oil Cloth Company of 320 Broadway, New York, is to be 696 x 1920 ft., one and two stories, of reinforced concrete construction. The estimated cost is $600,000.

The Mohawk Gas Company, Schenectady, N. Y., has plans completed for a retort house 53 x 112 ft., one story, which it will build on Villa road at a cost of $71,000.

The Lake Shore Seed Company, Dunkirk, N. Y., is having plans prepared for a modern fireproof factory building, five stories, to replace the building which was destroyed by fire last week with contents and machinery, entailing a loss of over $100,000. A large amount of new machinery and equipment will be required.

A large addition is being made to the silk mill of H. D. Ballard on Milford street, Binghamton, N. Y.

Bids are being received for a factory building 78 x 134 ft., two stories, to be erected by A. H. Durston, Syracuse, N. Y.

Contracts have been let for an addition to the filter plant of the Binghamton waterworks, Binghamton, N. Y.

The Presto Heater Company, Inc., Buffalo, N. Y., capitalized at $500,000, has filed incorporation papers and will manufacture water heaters. The incorporators are N. M. Cantin, Toronto, Ont., J. Duchmann, Jr., and L. F. Robinson, Buffalo.

The Elmore Milling Company, Oneonta, N. Y., has completed plans for a flour mill 80 x 92 ft., three stories and basement, and 54 x 100 ft., one story, which it will build at once.

The Pyrites Engineering Company, Carthage, N. Y.,

recently incorporated, has taken over and is continuing the business of the copartnership of the same name. The company has a number of contracts under way for the special engineering work in which it is engaged, consisting of the installation of pyrites burning plants in sulphur mills and sulphuric acid works, acid towers and waste lime recovery plants and apparatus for the rotary process of burning lime.

The Wood & Lowe Mfg. Company, Inc., Buffalo, recently incorporated with $25,000 capital stock to manufacture glues, printers' rollers, etc., will erect a plant. J. H. Clarkson, South Chicago, and A. M. Wood and A. L. Lowe, of Buffalo, are the incorporators.

The McCue Company, Buffalo, manufacturer of automobile axles, forgings and gears, will build an extensive addition to its machine shop and drop forging plant at Elmwood avenue, Grote street and the New York Central Railroad. C. T. McCue is president and general manager.

A four-story and basement addition 60 x 100 ft. is to be made to the meat products packing plant of the Danahy Packing Company, Metcalfe street, Buffalo.

Victor H. Canahan & Co., 1575 Niagara street, Buffalo, are having plans prepared for a two-story and basement factory 45 x 98 ft., which they will erect at once at West and Forest avenues.

L. B. Fellows, 16 Delavan street, Rochester, N. Y., has let the contract for the erection of a two-story and basement factory building 50 x 90 ft.

The Erie County Electric Company, Erie, Pa., has let the contract for the erection of its new power house.

The Eastern Concrete Steel Company, Buffalo, has received the general contract for construction of a blacksmith shop 40 x 225 ft. and a storehouse 77 x 180 ft. to be erected by the United States Hame Company, Buffalo, at its plant on Tonawanda street and the New York Central Railroad.

The Probst Realty Company, Rochester, is erecting a factory building on Elm street, Rochester, for the Varsity Candy Company, lessee, which will install machinery and equipment for the manufacture of confectionery.

The United States Rubber Reclaiming Company, Inc., Buffalo, will build and equip an addition to the boiler house at its plant, Babcock street and the Erie Railroad.

The Aluminum Castings Company, Buffalo, will build an addition to its Elmwood plant, Elmwood avenue and the Erie Railroad. Roger C. Adams is the manager of the company.

New England

BOSTON, MASS., June 24, 1913.

Business remains good, with a certain amount of letup in some lines. In part of these cases the change is seasonable. The tendency is to exaggerate depressing experiences. For example, the current report is that the textile machinery people are exceedingly dull. Such is not the case. Some classes of woolen machinery are not in active demand, but others are. One builder of woolen looms is receiving a large volume of current business, mostly in small lots, from a wide diversity of customers and the demand is increasing. Strange to say, the builders of cotton machinery are suffering more than the woolen machinery people. Complaint is heard from manufacturers of metal goods that it is impossible to secure reasonably early delivery of special machinery, particularly the automatics. The builders of standard machinery are doing a very fair business. Reports of improved conditions as compared with those earlier in the year are not rare. Of course the magnificent average production of a few months ago has been reduced to some extent, but doubt as to the future is based on surmise rather than on present-day facts and figures.

The Norton Company, Worcester, Mass., manufacturer of abrasive materials and their products, will erect this season a plant at Leicester, England, the purpose being to give the British trade the maximum of service by means of quick deliveries. Leicester is particularly prominent in the hosiery trade and also contains the English works of the United Shoe Machinery Company and the Revere Rubber Company of Boston. It is an important railroad center, and labor conditions are excellent, both of which facts entered into its selection as a site for the Norton Company's plant. The works will be on the Midland Railroad and will be served by a side track, which is a somewhat unusual convenience in England. The plant will be about the size of that established in Germany several years ago, but the plans provide for radical improvements in design. The main building will be 75 x 292 ft., three stories. Careful study has been given the problem of light and ventilation, and as a consequence of the width of the structure, which is necessary for the company's purposes, a central light well will be included in the construction. The silicate and elastic department will be located in a building 48 x 72 ft., with sawtooth roof, and another structure will be 40 x 260 ft. The works will be in operation early next year. William L. Neilson, manager of the German plant, will add the direction of the English works to his responsibilities. The Norton Company is to build a research laboratory and extend the furnace room at the Niagara Falls plant. At the home works at Worcester, Mass., the company will erect a two-story building 128 x 138 ft., which will be devoted to the manufacture of firebrick and saggars and all other refractory material used in burning wheels and which will also house the machinery for clay preparing and mixing. A one-story storage building will be erected, 30 x 140 ft.

The Chase Corporation, Waterbury, Conn., which controls large brass interests, has changed its name to the Chase Metal Works, Inc.

The General Mfg. Company, Waterbury, Conn., will build a two-story factory 28 x 77 ft., two stories and basement.

Landers, Frary & Clark, New Britain, Conn., will erect an additional factory which will be 42 x 260 ft., two stories.

Announcement is made that the control of the American Shear & Knife Company, Hotchkissville, Conn., has been purchased by R. A. Clark, Kansas City, Mo. It is stated that the business will be enlarged and that H. S. Dormitzer will remain in charge of the sales end.

Additions to general manufacturing facilities of New England include the following: Skat Mfg. Company, Hartford, Conn., addition 40 x 40 ft., two stories; H. C. Brenheimis, Southbridge, Mass., new factory; A. D. Carter, Tilton, N. H., three-story, 30-ft. extension to textile mill; Boston Felt & Rubber Company, Boston, recent purchaser of the mill at Webster, Mass., formerly ocupied by the Webster Felt & Rubber Company, building for rubberizing products; Berger Machine Company, Springfield, Mass., addition; Harley Company, Springfield, Mass., $20,000 addition; Hansen Shoe Company, Quincy, Mass., new factory at Brockton, Mass.; R. H. Norton, New Haven, Conn., two-story building for light manufacturing; Warner Bros. Company, Bridgeport, Conn., additional factory.

The Sentinel Automatic Gas Appliance Company, New Haven, Conn., has taken over the line of automatic gas soldering iron heaters which has been developed by the Oven & Equipment Mfg. Company of that city. The product comprises the atmospheric type; one for which light pressure is supplied from a fan blower; a blast heater, with air from compressor or positive pressure blower, and the heavy blast model which has air and gas lines with independent cocks for regulating the flame to suit heavy or light coppers. An important feature of this line is that the weight of the implement ignites the heating flame and upon the removal of the copper only a pilot light remains burning.

Bangor, Maine, has voted to authorize and instruct the committee on city water to buy a pump and properly equip a new well.

Holyoke, Mass., has voted in favor of a municipal lighting project.

Philadelphia

PHILADELPHIA, PA., June 23, 1913.

Business continues to drag and merchants report little buying of importance. Scattered orders represent the character of business coming to manufacturers of machine tools, but special machinery and equipment makers are receiving a fair amount of new business. There is an increasing disposition to await further developments. Tariff matters particularly appear to have a decided bearing on the general situation. At this season some slowing down in business is usual and quieter conditions are generally anticipated during the summer months. A very fair amount of business in power equipment continues to come out. The second-hand machinery market is irregular. Tool equipment concerns find a fair volume of business. Other merchants report trade as being dull.

The Buckwalter Stove Company, Royersford, Pa., is preparing to purchase and install a sand blast cleaning system in its foundry. A polishing machine will also be purchased.

The Greenwald Packing Company, Baltimore, Md., has submitted plans to contractors for estimates on a refrigeration and cold storage plant addition at Wilkins avenue and the Baltimore & Ohio Railroad. The

building will be of reinforced concrete. Otto Kublitz is the engineer.

The Reading Merchants Ice Company, Reading, Pa., has authorized an increase in capital stock from $50,000 to $150,000. Plans including equipment for a new ice-making plant are being considered. The present plant has a capacity of 100 tons. The company recently purchased a site on which the new plant will be erected, at Pear street and the Lebanon Valley Railroad.

The Collins Carriage Company, Camden, N. J., is considering the erection of an 18 x 68 ft. addition to its plant, including an extension of the boiler room. The purchase of more power equipment will be considered later in the summer.

Plans are being prepared by Albert Kahn, Detroit, Mich., for a ten-story brick, steel and concrete building, 260 x 320 ft., to be erected for the Ford Motor Company, on a site recently acquired at Broad street and Lehigh avenue. The plant when completed will be used largely by the company for the purpose of assembling motor cars.

It is stated that the Lehigh Coal & Navigation Company will install considerable additional power equipment at its plant at Lansford, Pa., including one 100-hp. and one 125-hp. motor, three 40-kw. and three 50-kw. transformers, etc. Specifications covering this equipment have not yet reached the Philadelphia office of the company.

Bids were opened recently by a committee of the Council of Camden, N. J., for the construction and installation of equipment for a municipal lighting plant. It is stated in the daily papers that the Atlantic Construction & Supply Company, Atlantic City, N. J., was the lowest general bidder, covering the power house, machinery installation, laying conduits and the wiring system. Bids were ordered scheduled and will be acted upon at the next meeting.

Plans have been filed for the proposed concrete warehouse building to be erected for the J. D. Larkin Company, at Twenty-second and Arch streets. The Aberthaw Construction Company has the contract for the building, which will be 136 x 166 ft., ten stories.

Work has begun on the new plant of the Marietta Brass & Iron Foundry Company, Marietta, Pa., manufacturer of brass, iron, bronze and aluminum castings. A large cupola and crane will be installed, but information concerning machinery requirements is not yet available .

The Council of Royalton, Pa., has turned down all bids for the installation of an electric light system, and has determined to put in a municipal plant.

H. D. Dreyer & Co., Baltimore, Md., manufacturers of wooden boxes, will erect a brick fireproof factory building at Aliceanna and Spring streets.

Chicago

CHICAGO, ILL., June 23, 1913.

The East Chicago Company has issued a booklet covering the advantages of the Calumet manufacturing district south of Chicago which contains information of considerable interest to the machinery trade. This district has been a prolific source of business in machine tools and the promise for the future held out in the prospects for new industries deserves close attention. The largest project of the near future is the plant of the Baldwin Locomotive Works, but as yet the market has received no indication of the equipment to be purchased. Railroad buying of machinery has been quiet. The Chicago & Alton Railroad is taking prices on a small additional list of tools for its new Bloomington shops, the list including a 36-in. engine lathe, an 18-in. engine lathe, a 50-in. drill press, a 24-in. shaper, a 2-in. double bolt cutter and a double emery tool grinder. The miscellaneous inquiry for machine equipment from the manufacturing trade, while rather light, supplies a fairly steady stream of business.

The Stewart-Warner Speedometer Corporation has had plans completed for the addition to its plant at Beloit, Wis. The new building will be 120 x 392 ft. and will cost $60,000.

D. C. Blanchard, West Division and Claremont avenues, Chicago, is building a four-story warehouse and garage 48 x 125 ft., to cost $40,000.

The Cram-Reichstag Metal Frame Action Company, Chicago, recently incorporated to manufacture piano frames and actions, has had plans prepared for a two-story factory, 65 x 200 ft., with a boiler house 32 x 70 ft.

The Doscal Company, manufacturer of hardware specialties, 180 North Dearborn street, Chicago, has made arrangements for the acquisition of a factory at Streator, Ill., and will remove its plant to that city.

The Great Northern Power Company, Duluth, Minn., has filed a notice of an increase in its capital stock from $2,250,000 to $11,000,000 to provide for an expansion of its projects.

The Topeka Edison Company, Topeka, Kan., is building an addition to its plant in that city which will cost $10,000 and will provide for the installation of 1500-kw. additional capacity.

The Gypsum Products Company, Chicago, has acquired a tract of four and one-half acres in the Clearing district and will erect two two-story manufacturing buildings to cost $50,000.

The Makutchan Roller Bearing Company, McCormick Building, Chicago, whose plant has been located at Hobart, Ind., has acquired a one-story factory, 100 x 300 ft., at 826 Fifty-sixth avenue, Chicago.

The Goble Lock Nut & Tie Company, Grand Rapids, Mich., has been organized with a capital stock of $50,000 by M. M. Goble, D. W. Giddings and C. R. Brown, all of Grand Rapids.

The Carl Anderson Company, 876 Larrabee street, Chicago, has been incorporated with a capital stock of $11,000 to manufacture engines and general machinery by Carl Anderson, Silas Howe and Enoch Peterson.

The Mechanics Machine Company, Rockford, Ill., has filed notice of an increase in its capital stock from $50,000 to $250,000 to provide for the manufacture of the Rockford truck, which is now being built by the company.

The Central Engineering Company, Chicago, has been incorporated with a capital of $10,000 by F. W. Craft, R. M. Erskine and M. Monahan.

Silver Creek, Neb., has voted $16,000 bonds for constructing an electric light plant and a waterworks system. D. F. Davis is village clerk.

Wilber, Neb., has voted $12,000 bonds for the reconstruction of the electric light system.

Bids will shortly be required for constructing a waterworks system at Utica, Ill., estimated to cost $16,000. Edward Byrne, La Salle, Ill., is consulting engineer.

A bond issue has been voted by Garwin, Iowa, for a waterworks system.

The Wahl Adding Machine Company, Chicago, has had plans prepared for a one and two-story factory at Roscoe boulevard and West Ravenswood Park to be 125 x 175 ft.

The Chicago Foundry Company, 211 North Fifty-seventh street, Chicago, has completed plans for the building of a one-story foundry to be 100 x 155 ft., and to cost $20,000.

The American Car & Foundry Company will build a one-story power house 25 x 50 ft. at its Chicago plant, the building to cost $5400.

Willis & Smith, 5745 South Halsted street, Chicago, have taken out a permit providing for the erection of a one-story garage, 84 x 123 ft., to cost $10,000.

The Slauson Mfg. Company, Cedar Rapids, Ia., organized by S. A. Slauson, L. E. Slauson and L. W. Sullivan to manufacture steel farm gates, has secured manufacturing quarters and is equipping a shop.

Guggenheim Bros., Chicago packers, are completing plans for the erection of a $110,000 plant on West Forty-sixth street.

The K. & F. Mfg. Company, Kenosha, Wis., has been organized to manufacture glass and metal containers, sealing devices and similar attachments, and is equipping a shop. M. H. Kavanaugh is president and Jas. H. Follen factory manager.

The Acme Reamer & Tool Company, Chicago, has been incorporated with a capital of $2500 for manufacturing tools by G. A. Dahlberg, attorney, 133 West Washington street, Gurdon Williams and V. E. Ringquist.

The Topeka Edison Company, Topeka, Kan., is about to award contracts for a 50 x 75 ft. addition to its power plant, to provide for an additional steam engine-generator unit to develop 1500 kw, which is to cost $10,000.

The Sieg Iron Company, Davenport, Ia., jobber of iron and steel products and machinery, has absorbed the Peter Lamp Iron Company, also of Davenport. Additional buildings will be erected to accommodate the enlarged operations of the consolidation.

The Cyclone Fence Company, Waukegan, Ill., has had plans prepared for an addition to its recently completed factory, the new building to be 130 x 160 ft. and to cost $20,000.

The Brown & Bigelow Company, St. Paul, Minn., is erecting a new three-story plant which will contain five acres of floor space. The first floor will be occupied by stock rooms and a large room to be fitted up for

the use of the employees. The offices and calendar finishing department will be located on the second floor and part of the third floor will be devoted to the manufacture of leather and celluloid novelties.

The Schurmeier Wagon Company, Minneapolis, Minn., has had plans prepared for a new factory building.

Milwaukee

MILWAUKEE, WIS., June 23, 1913.

No new orders of consequence have been booked by Milwaukee machinery and tool builders the past week, but they have had no difficulty in keeping their shops as busy as before in executing old orders. The shops are now beginning to catch up with delivery specifications. Slow collections cause some comment. The labor situation is good.

The International Steel Construction Company, Waukesha, Wis., has increased its capital from $10,000 to $50,000 and will extend its activities.

The Milwaukee County Board of Supervisors is arranging for a competition among American architects to secure plans and specifications for the proposed new Milwaukee county courthouse, which will cost between $1,000,000 and $2,000,000. Oscar E. Schwemer is chairman of the committee having this in charge.

Jacobsen & Ackerman, engineers, Grand Rapids, Wis., have taken a contract to build and equip a 25-ton bleaching mill for the Nekoosa-Edwards Paper Company, Port Edwards, Wis.

The Gehl Bros. Mfg. Company, West Bend, manufacturer of agricultural implements, is enlarging its plant by the addition of a power house and engine room, 50 x 90 ft., and a warehouse, 80 x 80 ft. Some new power equipment will be purchased.

Operations have been started by the K. & F. Mfg. Company of Kenosha, in the manufacture of containers, sealing devices, bottle and jar caps and similar specialties designed by James H. Follen, its general manager. Quarters have been secured in the Parish Building and a force of expert tool and die-makers is engaged in preparing for the factory run. M. H. Kavanaugh, Chicago, is president, E. A. Kavanaugh, vice-president; W. E. Ferreira, secretary, treasurer and sales manager.

The Pennsylvania Coal & Supply Company, Milwaukee, sustained a loss of $50,000 by the collapse of the big crane and hoists on its Sixteenth street coal dock during a windstorm. The hoists will be rebuilt at once.

The Saxe Amusement Company, Milwaukee, is preparing to build a large structure to seat 3500 and have dimensions 125 x 150 ft. It will be of steel and brick construction with a trussed roof. Architects' plans will not be ready until July 1.

The contract for the elevator in the new Federal building at La Crosse, Wis., has been awarded to the Otis Elevator Company at $6693.

The La Crosse Rubber Mills Company, La Crosse, Wis., manufacturer of rubber boots and shoes, is erecting a four-story concrete building, 50 x 200 ft., which will more than double its present capacity.

The Harris Typewriter Mfg. Company, succeeding the bankrupt Harris Typewriter Company of Fond du Lac, Wis., has perfected its organization and will enlarge the plant at once. The daily output will be 15 typewriters daily and the working force will be increased from 125 to 150. Sears, Roebuck & Company, Chicago, have contracted for the entire output. Some new machinery and tools will be purchased at once. F. J. Rueping is president and T. L. Doyle is secretary.

The Milwaukee County Board of Supervisors has voted to take up at once preliminary plans for the proposed new house of correction plant, or group, at a cost of $600,000 or more. Leenhouts & Guthrie, architects, Milwaukee, are in charge of the design and expect to present their work immediately after July 1.

Indianapolis

INDIANAPOLIS, IND., June 23, 1913.

The Enterprise Iron Works, Indianapolis, has been incorporated with $50,000 capital stock to do an iron manufacturing business. The directors are H. I. Raymond, Jr., Wm. H. Holmes and W. S. Glass. The same men are the directors of the Enterprise Foundry & Fence Company, with $50,000 capital stock. The one is a holding company, the other the operating company.

The Elwood Iron Works, Elwood, Ind., recently organized to manufacture crude oil engines of the compression type, has signed a contract to supply the L. Zinze Company, Chicago, with not less than 500 engines a year. The directors of the company are B. F. and A. L. Lambert, of Anderson, Wayne Leeson, H. C. Callaway, M. J. Fogarty, R. F. Broadbent and George Spoor of Elwood.

Thomas Crozier, shipbuilder, Evansville, Ind., is organizing a company to build marine ways and dry docks.

The Pioneer Pole & Shaft Company, Oakland City, Ind., is being moved to Evansville.

The Shelby Foundry Company, Shelbyville, Ind., has been incorporated with $10,000 capital stock, to operate a foundry. The directors are Henry Jones, A. H. Schnaitter and R. D. Thornburg.

Joseph E. Hennings has bought the interest of Frank P. Dunn and Martin Dunn in the United States Electric Company, Anderson, Ind., which manufactures patent cigar lighters, cigar clippers and other novelties.

The Kerr Murray Company, Fort Wayne, Ind., has been incorporated with $50,000 capital stock to manufacture machinery. The directors are A. D. Cressler, H. I. Lee and T. E. Ellison.

The Modern Specialties Mfg. Company, maker of self-heating flat irons, has moved its plant from Goshen to South Bend, Ind.

The suit of the Anderson Tool Company, Anderson, Ind., against the Toledo Computing Scale Company, Toledo, Ohio, in the Federal Court, at Indianapolis, has been dismissed by the complainant.

Joseph Bruns has been appointed receiver of the Ohio Falls Motor Company, New Albany, Ind., successor to the American Automobile Corporation, which went into receivership a year ago.

The Moon Machine Company, Muncie, Ind, has been incorporated with $50,000 capital stock to manufacture machinery. The directors are W. H. Moon, C. R. Moon, H. R. Bard, C. E. Whitehill and O. P. Perkins.

The Batesville Cabinet Company, Batesville, Ind., has been incorporated with $70,000 capital stock to manufacture furniture. The incorporators are George M. Hillenbrand, John A. Hillenbrand and Anthony W. Romweber..

The Crawford & McCrimmon Company, Brazil, Ind., manufacturer of hoisting and hauling engines, mine fans and pumps, is building a new plant of concrete, brick and steel construction, on a nine-acre tract of ground, the machine shop to be 100 x 200 ft., and the foundry, 80 x 180 ft. An office building and power house will also be erected. When completed the present plant will be entirely dismantled.

The Rockwood Mfg. Company, Indianapolis, manufacturer of automatic sprinkling systems, is building a $7,000 addition to its plant.

The Christian Machine Works, Indianapolis, has been incorporated with a capital of $2500 to operate a machine shop by Sigel Kopf, James A. Bowden and Stephen Christie.

The Cole Motor Car Company, Indianapolis, Ind., is erecting a four-story addition to its plant. The company does not manufacture its own parts and is not in the market for any machinery, but will install a heating system, elevators, electric wiring, etc.

Detroit

DETROIT, MICH., June 24, 1913.

Small orders of machinery and tools have been placed quite steadily the past week and merchants are inclined to view the week as a bright spot in an otherwise rather dull month. Inquiries are coming in rather slowly and there is no prospective business of any magnitude in sight. The demand for second-hand machinery is moderately active and buying is stimulated by the large and varied stock dealers have been able to offer lately. Manufacturing plants do not show much curtailment in their output and considerable new business is being booked, but it is very evident that manufacturers are generally not putting much money in extension or equipment this summer. New labor troubles have cropped out this week at the automobile plants of the Studebaker Corporation in Detroit and in certain branches of the metal working industry at Muskegon. Building circles are active but the class of new construction work is rather uninteresting to the machinery trade.

The Burroughs Adding Machine Company, Detroit, has let the contract for a large addition to its plant. No list of equipment has been made up as yet.

The Gypsite Fireproofing Company, Detroit, has been incorporated with $20,000.00 capital stock and will engage in the manufacture of various roofing materials.

E. P. Raymond, David Stott and A. Fitzgerald are the incorporators.

The large planing mill of Tonn & Schreiber, Detroit, was totally destroyed by fire, June 16, entailing a loss of $50,000. The rebuilding of the plant will be undertaken at once.

The Lee Glass Company, Detroit, has taken out a building permit covering the erection of a three-story brick factory, 40 x 100 ft., to cost about $10,000.

The Automatic Lamp Control & Accessory Company has been incorporated with $10,000 capital stock to manufacture lamp controls, self starters, etc. George W. Bowman, 123 Linden street, is the principal stockholder.

The Armitage Leather Company, Detroit, has increased its capital stock from $25,000 to $200,000 and will extend its operations.

The Detroit Equipment Company, Detroit, has been incorporated with $6,000 capital stock by H. W. Sullivan and O. W. Flynn and will engage in the manufacture of factory supplies.

The John J. Brown & Sons Company, Detroit, has filed articles of incorporation giving its capital stock as $120,000, to manufacture boilers. John J. Brown and James J. Brown are the principal stockholders.

The Deadlock Elevator Company, Detroit, has been incorporated with $3000 capital stock by T. T. Boyle and A. H. Everett, to manufacture elevator locks.

The Detroit Lumber Company, Detroit, has acquired a site of 15 acres at Junction avenue and the river and will erect a fireproof planing mill, finish factory and other buildings, and will construct suitable dockage facilities to serve the plant. Christian Hecker is secretary.

The Alma Motor Truck Company, Alma, Mich., has been organized by F. W. Ruggles, George Perry and William Hogle, and will take over the truck manufacturing business of the Alma Mfg Company. Several service stations will be established and some new equipment installed.

The National-Standard Company, Niles, Mich., has been incorporated with $150,000 capital stock to take over the National Cable & Mfg. Company, Niles, and the Cook Standard Tool Company, Kalamazoo. The new company will manufacture railroad tools and devices, cables and special machinery and tools. W. F. Harrah has been elected president, E. E. Cook, secretary, and W. H. Perkins, treasurer.

The John J. Raab Chair Company, Grand Rapids, has purchased a factory site and is contemplating the erection of a new plant.

The plant of the W. T. Davis Machine Company, Comstock, Mich., was completely destroyed by fire June 12. The factory was a frame building 50 x 100 ft., and the estimated loss is $10,000.

The Grand Rapids Wood Furnishing Company, Grand Rapids, Mich., has begun the construction of a two-story addition to its factory.

Cleveland

CLEVELAND, OHIO, June 24, 1913.

The volume of orders that is being booked by dealers is light, being confined almost entirely to single tools. Not a great deal of business is in prospect in the form of inquiries. The demand for second-hand machinery is not active. Local machine tool builders are getting a steady volume of business but their orders are not as plentiful as during the early spring. Plants are filled up for some time ahead with these old orders and continue to run at full capacity. With new orders that are coming in and those now on their books, manufacturers generally expect to have enough work to keep their plants busy during the quiet summer months. The labor situation continues unsatisfactory. While some machinists are seeking work, skilled workmen are exceedingly scarce.

The American Steel & Wire Company is in the market for about 20 machine tools, inquiries for which have been sent out piece-meal from its Cleveland offices during the past few weeks. Its last list issued during the week includes a 26-in. drill with sliding head, a single spindle sensitive drill, a 24-in. lathe and a turret lathe for 2-in. bar stock, all to be motor-driven.

G. F. Mitchell & Son, Cleveland, Ohio, have placed a contract for the erection of two additional stories to their plant, which will double its present capacity. The concern will add to its present line of light sheet metal stampings the manufacture of heavy stampings for automobiles. It will also largely increase the size of its present die department. It will be in the market shortly for several large presses. For its die department it will buy a planer, two shapers, two lathes and a milling machine.

The large stamping plant that is being erected in Canton, Ohio, by interests affiliated with the Berger Mfg. Company, will be ready for operation in October. The plant adjoins that of the Berger Company. The main building will be 400 x 600 ft. It is claimed that the plant will be the most up to date stamping plant in the country for the manufacture of kitchenware. The plant will be operated under the name of the General Stamping Company.

The South Akron Stamping Company, Akron, Ohio, has been incorporated with a capitalization of $10,000 by John W. Wehner, George Fetterman, Frank Koehl, and R. J. Baun. A plant will be erected.

The National Railway Equipment Company, Toledo, Ohio, has been incorporated with a capitalization of $10,000 by Charles Weirich, Frank W. Caughling and others, to manufacture locomotive parts and other railroad equipment.

The Foster Power Sharpener Company, Fostoria, Ohio, has been incorporated with a capitalization of $5000 by V. H. Michener and others to manufacture a lawn mower sharpener.

The F. B. Stearns Company, Cleveland, manufacturer of automobiles, has purchased a site adjoining its present quarters on which, it is stated, it will erect a large plant addition.

The Landers Bros., Toledo, Ohio, have purchased a site on the Lake Shore Railroad near the American Can Company's plant where they will erect a large plant for the manufacture of buckram, webbing, and upholstering material.

The Standard Table Oil Cloth Company has placed contracts for the erection of a large addition to its plant near Girard, Ohio.

The Hydraulic Press Mfg. Company, Mt. Gilead, Ohio, has placed contracts for a large erecting shop. The contract for the structural work was awarded to the Hughes-Keenan Company, Mansfield, Ohio.

The Allen Motor Car Company, Fostoria, Ohio, is planning the erection of a two-story plant 60 x 225 ft. This company has taken over the Peabody Buggy Company, and will also manufacture buggies. The company recently completed its organization. E. W. Allen is president, W. O. Allen treasurer and general manager, and Arthur Wyant secretary.

The Champion Spark Plug Company, Toledo, Ohio, will enlarge its plant by the erection of a 4-story concrete and steel building 60 x 120 ft.

Barberton, Ohio, has voted a bond issue for financing an electric light and waterworks plant.

S. A. Haskell, director of the public service, Painesville, Ohio, will receive bids until July 8 for a 3,000,000-gal. water purification works.

R. M. Pillmore, director of public service, Akron, Ohio, will receive bids until July 1 for cutting-in sleeves and valves.

Cincinnati

CINCINNATI, OHIO, June 24, 1913.

There has been no improvement in the machine tool trade, and new orders are scarce. The majority of the manufacturers in this particular line do not see any prospect for a change during the summer months, and while no retrenching has been done so far this may become necessary later on. There is considerable business pending from the railroads, but they are slow in closing. However, it is reported from a few sources that the export trade has livened up lately. Second-hand machinery business is very dull. Boiler and tank manufacturers are busy, mostly on tank orders.

The Swing-Bickett Company, 124 Government place, Cincinnati, will soon commence the manufacture of cut gears. A specialty of the machine tool trade requirements will be made. No additional machinery is required at the present time, although the company expects to increase its manufacturing facilities at no distant date.

Frank Hill Smith, Dayton, Ohio, has the contract for the construction of the four-story factory addition to the plant of the Charles W. Brenneman Company, Cincinnati, mention of which was recently made. The same contractor will also erect a large shoe factory at Portsmouth, Ohio, for the Excelsior Shoe Company.

The Breese Brothers Company, Cincinnati, has made arrangements for establishing a branch factory at Hamilton, Ohio, which will be devoted principally to the manufacture of metal roofing specialties. A location was secured through the Hamilton Chamber of Commerce and the new factory will be in operation within the next two months.

The municipality of Newport, Ky., is considering the installation of an ice plant. No definite action will probably be taken on the proposal before next fall.

The city of Norwood, Ohio, a Cincinnati suburb, has voted favorably on an extension to the municipal waterworks plant. Bids will soon be asked for on considerable power and pumping equipment as well as a water softening plant.

The Hayden-Corbett Chain Company, Columbus, Ohio, is making a small addition to its plant. No additional machinery will be required.

The Platt Iron Works Company, Dayton, Ohio, has lately received several large Government and foreign orders for air compressors, pumps and water wheels and is now operating to full capacity.

The plant of the H. J. Ready Elevator Company, Cincinnati, was destroyed by fire June 20. No rebuilding plans have yet been given out, but it is understood that the company will reconstruct its factory as soon as insurance adjustments have been made.

The Hickman Electric, Water & Ice Company, Hickman, Ky., contemplates making some extensions to its plant in the near future.

Bender Striebig & Co., Cincinnati, have acquired a site on West Sixth street, on which they contemplate erecting a large cold storage plant some time in the future.

It is reported that the Standard Oil Company proposes to build a refinery and large storage warehouse in Marietta, Ohio. The company's present plant in that city was badly damaged by the recent floods.

The Mahlke Mold & Machine Company, Wheeling, W. Va., has moved into new quarters. Some additional equipment is being added.

The Central South

LOUISVILLE, KY., June 24, 1913.

The rapid approach of a new fiscal year has resulted in buyers for four large corporations which close their accounts June 30 holding off until after the turn of the new trade period. This and the beginning of the vacation season, together with the general tendency of business men to proceed conservatively at present, is having the effect of holding machinery business down to average proportions. At that, manufacturers are running their plants full time, as a rule, and are simply not making the expansions that are usually counted on. Machinery manufacturers and dealers continue to report plenty of prospects for business, and are not at all discouraged by recent developments. Boiler business continues a leading item, power equipment needs being well up to the average.

The Lanham Hardwood Flooring Company, Twelfth and Magnolia streets, Louisville, will enlarge its heating plant on account of the erection of a new warehouse.

The W. J. Gillette Mfg. Company, Louisville, is planning an increase in the capacity of its plant. It manufactures vehicle woodstock.

The Mengel Box Company, Louisville, advises that the site recently secured adjoining its plant will be used for yard purposes, instead of for factory work, for the present, at least.

The W. P. Smith Auto Repair Company has been incorporated in Louisville with $10,000 capital stock by Walter P. Smith and others. It has taken over a going shop at 728 South Fourth avenue. Extensions are contemplated later on.

C. A. Swann has been put in charge of the old Louisville Bolt & Iron Company's plant at Jones and N streets, Louisville. It is being put in shape to resume operations, the Louisville Steel & Iron Company being the name of the proposed new operating company.

The Louisville Gas & Electric Company, the name of the new public service corporation which takes the place of several companies now in the field, will erect a large garage and stables at Seventh street and Ormsby avenue. It will be equipped with a machine and blacksmith shop for repairs. Gen. George H. Harries is president of the company.

The Louisville Pottery Company is planning the purchase of new equipment. It manufactures flowerpots, jugs and other clay products.

The Winchester Water Company, Winchester, Ky., is planning the construction of a pipe line connecting with the Kentucky River. On account of the height of Winchester above the river several high-pressure pumps will have to be installed.

The Perryville Ice & Light Company, Perryville, Ky., has announced plans for enlargements. A new boiler has already been ordered and additional electrical equipmeent will be installed so as to provide 24-hour current. The ice factory will be doubled in capacity. Address Col. W. J. Debaun.

The Kentucky Distilleries & Warehouse Company, Louisville, is planning the enlargement of its distillery near Paris, Ky., known as the Lewis Hunter plant. The capacity will be increased from 600 to 700 bushels a day. This will probably call for additional grinding and conveying equipment, while a drying system for handling spent grain will be installed. J. A. Wathen, Louisville, may be addressed for details.

The Lack Singletree Company, Paducah, Ky., is planning to install a forging department.

The tipple, power house and machine shop of the Caldwell Mining Company at Browders, Ky., were destroyed by fire June 16 with a loss of $30,000. The company plans to replace the equipment at once.

The Grayson Springs Hotel Company is being organized to construct a $200,000 hotel plant at Grayson Springs, Ky. An electric light plant, refrigerating machinery and other equipment will probably be needed. J. G. Gallagher, a real estate man of Louisville, has the project in hand.

The Jefferson City Milling & Electric Company, Jefferson City, Tenn., is to dispose of its electric light plant at public auction June 28. Its value is estimated at $18,000. M. C. Franklin is the owner.

The sawmill of R. J. Darnell, Inc., Memphis, Tenn., was destroyed by fire June 15 with a loss of $100,000. All of the special equipment was destroyed but the power plant was not damaged. The company will begin immediately the reconstruction of the mill.

The Middle Tennessee Traction Company, Nashville, Tenn., is planning the construction and equipment of repair shops at Franklin, Tenn. John A. Pitts is president of the company.

A large automobile garage, repair shop and showroom will be erected and equipped by H. W. Steger and others at Pulaski, Va. The building will be erected of steel and concrete. The repair shop will have a full equipment, consisting of lathe, drill-press, etc., and a hot water heating system will be installed.

The Parker Buggy Company, Suffolk, Va., which recently suffered the loss of its factory by fire, has arranged to proceed with rebuilding at once.

The Lewisburg Foundry Company, Lewisburg, Tenn., manufacturer of stoves, steel ranges, heaters, and general castings, has taken over the plant of the Sheffield Steel Range & Stove Company and is enlarging its capacity by the erection of additional brick buildings. No new equipment will be required.

The John P. Dale Machinery Company, Nashville, Tenn., has sold an Erie City engine to the Johnson Lumber & Supply Company, Bunnell, Fla. The company reports a heavy demand for sawmill and woodworking machinery.

The Dayton Hosiery Mill Company is being organized at Dayton, Tenn., and will establish a plant at a cost of $50,000. The equipment cost will be in the neighborhood of $30,000. Electric drive will be used throughout. Garnett Andrews, Chattanooga, Tenn., is to be in charge of the mill.

Wheeling

WHEELING, W. VA., June 23, 1913.

The Fairmont & Clarksburg Power Company has filed with the Public Service Commission at Charleston, W. Va., an application for a permit to condemn lands and construct dams. It intends to erect two power plants, No. 1 at Valley Falls, fourteen miles below Fairmont, and No. 2 in Taylor County. Dams have been located for two storage reservoirs, one on the Buckhannon River and the other on the middle fork of the Tygart Valley River.

The Virginian Power Company will ask the Public Service Commission of West Virginia on July 15 for the right to build a dam in New River, near the mouth of the Bluestone. The company will spend several million dollars in improvements. The large steam plant at Cabin Creek Junction is nearing completion. The main lines of the company will carry 66,000 volts.

W. W. Pettitt, chairman of the local commission, Front Royal, Va., will receive bids until July 21 for a 1,000,000-gal. mechanical filtration plant.

The Eagle Glass & Mfg. Company, Wellsburg, W. Va., will erect a four-story brick and steel factory building, 63 x 167 ft., for the manufacture of oil cans.

At a meeting of the board of directors of the Enterprise Enamel Company at Bellaire, Ohio, action was taken which will probably result in the combination of practically all the enamel ware manufacturing

concerns of the Ohio Valley. A meeting of the stockholders was called for July 1 to consider the proposed agreement for the sale of the entire property and assets of the company. It is said the move for consolidation of the various interests originated with the Geiger-Jones Company, Canton, Ohio. Others included in the proposed consolidation are the Canton Enamel Company, Novelty Stamping Company, Bellaire, Ohio, and United States Stamping Company, Moundsville, W. Va.

Fire at the plant of the Charleston Window Glass Company at Charleston, W. Va., caused a loss of $15,000. The flattening room was destroyed.

The Glady Mfg. Company has been incorporated with $20,000 capital to engage in the timber business. The incorporators are R. Chaffey, G. G. H. Hass, D. T. Strock, S. T. Spears, all of Elkins, W. Va., and Preston Harman, of Harman, W. Va.

The Morgan Run Land & Lumber Company, Clarksburg, W. Va., has been incorporated with $75,000 capital by S. A. Smith, C. L. Showalter, Lewis M. Sutton, Howard Post, of Clarksburg, and H. W. Furbee, of Shirley, W. Va.

Birmingham

BIRMINGHAM, ALA., June 23, 1913.

Prompt settlement of a building trades strike and the practical certainty that there will be no further labor trouble in building lines during the summer, as well as assurance of a continuance of mining operations on an unusually large scale, have served to maintain the machinery and machine tool trades. Large dealers report a satisfactory volume of business and fair collections with such general activity in all directions as to indicate unusually good business through the summer.

The Dunbar Brick Company, Augusta, Ga., has been incorporated with a capital stock of $60,000 by D. S. Dunbar, H. H. Stafford and J. P. Arnstrong.

The Florida Hydraulic Brick & Stone Company, Bradentown, Fla., will establish a plant for the manufacture of brick, artificial stone, noiseless paving brick, tiles, etc., at Tampa, Fla. J. D. Butterfield, Bradentown, is president. The company will expend $75,000 for equipment.

J. H. Lippard, Daytona, Fla., has purchased a tract on which he will establish a cold storage plant at Tampa, Fla.

The Howell Cotton Company will establish a compress at Rome, Ga., on a site of eight acres recently purchased.

The Nye Odorless Garbage Crematory & Construction Company, Macon, Ga., has been incorporated with a capital stock of $150,000. Ralph E. Nye and John H. Lee, of Oklahoma, and H. H. Ayer and S. B. Hatfield, of Macon, are interested.

The Bradshaw Milling & Power Company, Blythe, Ga., has been incorporated with a capital stock of $2500.

A ginnery will be established at Grovania, Ga., with J. E. Hasenback as manager.

The Farmers' Gin Company, Sycamore, Ga., has been incorporated with a capital stock of $16,000 by W. D. Fountain, R. J. Powers and others.

The Farmers' Ginning Company, Warwick, Ga., has been incorporated with a capital stock of $5000 by A. J. Gaughf, W. E. Grubbs and others.

The Williamson Gin & Warehouse Company, Williamson, Ga., has been incorporated with a capital stock of $3000 by J. T. Freeman and W. S. Jones, Griffin, Ga., and J. A. Yarborough of Williamson.

Richard Tillis and A. H. Kratzer will establish an ice factory and a cold storage plant at Montgomery, Ala., which will cost $200,000.

Plans are being formed for the establishment of an electric lighting plant at Fort Gaines, Ga., at a cost of $10,000. It is proposed to develop water power on Chemochechobee Creek. Address the mayor of Fort Gaines.

The Atlanta Marble & Granite Company, Atlanta, Ga., has been incorporated with a capital stock of $20,000 by Dr. J. N. Cook, Atlanta; C. H. Smith and U. G. Scott, of Los Angeles, Cal., to quarry marble and stone near Atlanta.

Frank B. Wilson, Harrisburg, Va., contemplates the establishment of a match factory at Savannah, Ga.

The Dixie-Blue Puncture Plug Company, Atlanta, Ga., has been incorporated with a capital stock of $5000 by W. B. Lingo, E. F. Morris and others.

A. A. Duggar, Oral Springs, Fla., has purchased a site of eight acres at Winter Haven, Fla., and will establish a plant for manufacturing sash, doors and interior finish. J. F. Beard, Ocala, Fla., will manage the plant.

The mayor of Goldsboro, N. C., will receive bids until July 1 for a pumping station and a filter plant.

H. Roscoe Perkins and Henry C. Maxwell, Augusta, Ga., purchased the plant formerly occupied by the Woodward Mfg. Company and have organized the Perkins Sash & Door Company. The new company will manufacture rough and finished lumber, sash, doors, blinds, etc.

C. B. Wellborn, mayor, Royston, Ga., will receive bids until July 1 for waterworks.

J. B. Houser, mayor, Cherryville, N. C., will receive bids until July 1 for a pumping station, electric pumps, etc.

Work has been commenced on the new factory building for the Universal Plow Company, Florence, S. C., which will be located at East Florence.

The Durham Vehicle & Harness Company, Durham, N. C., will erect a three-story building which will be equipped for the manufacture of delivery wagons.

The Jackson Bros. Lumber Company, Tallapoosa, Ga., will build a planing mill with a daily capacity of 25,000 ft. The cost of the plant will be about $20,000.

The Pontotoc Electric Light & Power Company, Pontotoc, Miss., is considering the construction of a water system. In case it is built the company will install additional boilers and purchase pumps, mains, a steel tank, etc. L. E. Price is manager.

St. Louis

ST. LOUIS, MO., June 23, 1913.

The machine tool market has maintained its fair range of activity in single tool and replacement demand, together with a fair request for second-hand tools. No large tests are appearing and none are really expected until adjustment of the tariff situation is effected. Crop reports, however, are encouraging and collections are satisfactory.

The Cushing Refining Company, Kansas City, Mo., has been incorporated with $100,000 capital by H. N. Evans, O. G. Lee and E. D. Ellison. The construction and equipment plans have not been announced in detail.

The Spring Valley Utilities Company, Spring Valley, Ill., has been incorporated with $1,000,000 capital by Charles H. Brown, Roy W. Brown, C. Brown and Harry E. Brown to equip and also to purchase public utilities.

The Township Line Grain Company, East Lincoln, Ill., has been incorporated with $13,000 capital and will equip an elevator. The initial stockholders are W. H. Evans, Jacob Jaggi and J. M. Goodpasture.

The Yazoo & Mississippi Valley Railroad Company will build and equip car and machine shops and yards at Memphis, Tenn., involving about $3,000,000.

The Missouri & North Arkansas Railroad has begun work upon machine shops at Harrison, Ark., and is also placing equipment for water supply.

Thomas Pruden, Joseph P. Gant and others have incorporated the Back Creek Coal Company, Knoxville, Tenn., and will equip and develop coal lands to a daily capacity of 1000 tons.

The Monarch Coal Mining Company, Henryetta, Okla., has been incorporated with $10,000 capital by Harry Lantz of Muskogee, Okla., and others and will equip coal property for active work at once.

The sawmill and cotton gin of J. O. Magee at Sunny Hill, La., recently destroyed by fire, will be rebuilt and re-equipped.

The Ryan Cotton Oil Company, Waurika, Okla., will rebuild its cotton gin which was destroyed by fire early in the month of May.

A $25,000 corporation is being formed at Russellville, Ark., by W. H. Rankin, J. G. Faulkner, R. W. Ferguson and J. G. McFadden to establish and equip a cotton seed oil mill.

The Piggott Power Company, Piggott, Ark., has been incorporated with $25,000 capital stock by T. L. Davis, G. W. Seitz, C. W. Pollard and others to build and equip an electric plant.

An electric light and power plant and waterworks are to be built by the city authorities of Breaux Bridge, La., under the mayor's direction, the total cost running to $60,000.

The mayor of Cleveland, Okla., has charge of plans for the equipment of an electric light and power plant.

Under the superintendency of F. M. Peyton the city of Okemah, Okla., will install a 15-hp. engine, a 120-kw., 2300-volt generator, exciter, etc., in addition to present equipment.

The Tulsa Car Company, Tulsa, Okla., has been in-

corporated with $100,000 capital stock by E. R. Perry, J. B. Levy and M. Dickerman and will equip a motor car building plant.

A 10-ton ice plant and refrigerating machinery are to be installed at Walters, Okla., by the Oklahoma Ice Company.

The Pfeiffer Chemical Company, St. Louis, will equip a $40,000 addition to its manufacturing plant, 512 North Commercial street.

The Carbon Purifier Company, Lake Charles, La., recently incorporated to manufacture a carbon purifier under the J. H. Loy patent, has completed its plant plans and is in the market for mechanical equipment.

The Southern Wood Distillates & Fiber Company, Bogalusa, La., has decided on plans for enlarging its Bogalusa plant at a cost of $250,000. George R. Wright, American Trust Building, Chicago, is president.

The Jonesboro Peanut Hulling Company, Jonesboro, Ark., has bought the Jonesboro Wagon Company plant and will re-equip at a cost of $35,000 for the peanut hulling business.

The Oklahoma-Tennessee Oil & Gas Company, recently incorporated with $150,000 capital stock by T. E. Johnson, J. M. Condit, L. M. Hall and H. F. Stone of Oklahoma City, Okla., has completed its plans and is now in the market for considerable drilling equipment.

The Paragould Ice & Light Company, Paragould, Ark., has plans for enlarging its plant and will build an addition, installing new equipment.

The Fee-Crayton Lumber Company, Dermott, Ark., will build several sawmills to work up hardwood lumber on tracts recently bought by the company.

W. A. Scott, Glover, Okla., will build and equip three sawmills near Jeannette, Ark., in Crittenden County, to work up 25,000 acres of timber land.

E. R. Buster, C. G. Griffin and W. H. Buster have incorporated the C. G. Griffin Lumber Company, Kingsland, Ark., with $25,000 capital stock, and will equip a mill at once.

The Valley Lumber Company, Camden, Ark., recently incorporated by L. Sparkman and others with $50,000 capital stock, is in the market for equipment for use near Reader, Ark.

The Salco Land & Gravel Company, Benton, Ark., has been incorporated with $25,000 capital stock by F. C. McClanahan and others and will equip a sand and gravel plant.

W. H. Cooper, H. H. Niehaus and Marion Harris have incorporated the W. H. Cooper Lumber Company, Eldorado, Ark., with $15,000 capital stock and will equip a mill.

The Housberger-Monro Lumber Company, Fort Smith, Ark., will build a sawmill near D'Arbonne in Louisiana.

J. L. Sidney and S. W. Fairchild of Vinton, La., have incorporated the Fairchild Lumber Company and will equip a $15,000 saw and planing mill.

The Grove Lumber Company, Grove, Okla., has been incorporated with $20,000 capital stock by W. A. and L. I. Scott and will equip a mill.

The Wentworth Land & Mining Company, Wentworth, Mo., is in the market for the machinery, etc., for a 200-ton mill, including a 100-hp. engine, closing the bids in July. A 1000-ft. air compressor will also be installed.

The Pioneer Cotton Mills, Guthrie, Okla., has increased its capital from $150,000 to $200,000 to enable enlargement of the plant and the addition of mechanical equipment.

A waterworks plant to cost $10,000 has been authorized by the city of Richton, Miss., the mayor to have charge of the work.

Waterworks costing $12,000 are to be built by the city of Owensville, Mo., with bonds already authorized.

The Thomas Powers Company, Cape Girardeau, Mo., recently incorporated, will equip a woodworking plant for the manufacture of novelties.

The Pond Creek Mill & Elevator Company's plant at Pond Creek, Okla., is reported burned with a loss of $100,000.

The supervisors of Franklin County, Miss., are in the market for heating, plumbing and electric equipment for the court house at Meadville, Miss.

The Wewoka Oil & Gas Company, Wewoka, Okla., recently incorporated, is in the market for considerable equipment.

The Champion Ventilator Company, St. Louis, has been incorporated with $16,000 capital stock by Thomas E. Vaughan, John H. Bruninga and A. C. Stewart to equip a plant to manufacture ventilating devices and machinery.

The Inventors' Company, St. Louis, has been incorporated with $100,000 capital stock by W. F. Sweet, M. P. Smith and C. S. Butler to equip a plant for the development of inventors' devices.

The Black Mfg. Company, McAlester, Okla., has established a sheet metal working plant for the manufacture of well buckets from galvanized sheets.

F. S. Shields, secretary, New Orleans, La., will receive bids until July 28 for extending a drainage pumping station and for a traveling crane.

Jackson, Miss., has voted $100,000 for the erection of a filtration plant.

The Southern Ornamental Fence Company, McAlester, Okla., of which C. E. Lewis of that city is a principal stockholder, will build a factory for the manufacture of ornamental and other metal fence.

Texas

AUSTIN, TEXAS, June 21, 1913.

The machinery and tool trade continues good notwithstanding that this is the midsummer period when there is usually a falling off in all lines of business. Crop conditions continue favorable.

The Wheeler County Cotton Oil Company, Shamrock, Texas, has been incorporated to construct a cotton seed oil mill. The incorporators are Clarence Hocker, J. W. O'Neill and B. N. Dinwiddie.

Cornelius Haynie, Oklahoma City, Okla., and associates will soon purchase machinery for their new hosiery mill, which is to be erected at Wichita Falls, Texas, at a cost of $60,000.

J. B. Levy and associates are preparing to construct a plant at Tulsa, Okla., for building motor cars.

The Gulf, Colorado & Santa Fé Railroad will make improvements and additions to its shops at Cleburne, Texas, at a cost of $123,000. The work will soon be started.

J. M. Sansome and associates will establish a bottling works at Rodgers, Texas, and make other improvements at the hot wells which they own.

The Port Arthur Rice & Irrigation Company is installing additional machinery at its pumping plant near Port Arthur, Texas, and making other improvements at a cost of about $40,000. It will add about 8000 acres of land to its irrigated tract.

The Dundee Woolen Mills will soon begin the construction of a woolen mill at Dallas. The building will be six stories and basement and of concrete construction.

It is reported that a syndicate of Chicago men has taken over the projected White Rock canyon project, which was being promoted by Charles M. Lang of Salt Lake City and associates. It is planned to build a dam across the White Rock canyon, near Santa Fé, N. M., and construct a large hydroelectric plant. A system of power transmission lines is also planned, running to Albuquerque, Santa Fé and other places in New Mexico.

A. H. Parker and associates contemplate erecting four small ore reduction mills near Mesa, Ariz. Each mill will be of 25 tons capacity and will cost about $25,000.

John R. Rollins, St. Louis, Mo., and associates are preparing to construct a plant at Mexia, Texas, for the manufacture of terra cotta. It is stated that more than $100,000 will be invested in the enterprise.

Arrangements are being made to build a brick and tile factory at Rosenberg, Texas, at a cost of about $100,000. I. M. Staunton is interested.

Franklin R. Maxwell and associates are preparing to irrigate a large tract of land near Douglas, Ariz. Shallow well-pumping plants will be installed.

Spur, Texas, has voted $25,000 for a waterworks plant.

The Missouri, Kansas & Texas Railroad Company is increasing the equipment of its shops at Denniston, Texas, sufficiently to double their capacity.

Gray's Engineering Works, Galveston, Tex., has been incorporated with a capital of $7,000 by Harry Gray, John E. Mitchell and Edward H. Mitchell.

The Texas Power & Light Company, through W. B. Head, vice-president, announces plans for the building of a power plant on the Red River, near Dennison, Texas, the cost of which will approximate $750,000.

The Pacific Coast

SAN FRANCISCO, CAL., June 17, 1913.

Judging by orders actually booked, business in machine tools and most lines of machinery is rather quiet. Most of the tool business has been in small groups for automobile and repair shops, with a few single-tool orders from larger concerns. There is a great deal of figuring on all kinds of machinery, and

some important transactions will doubtless be closed in the near future, but many contemplated improvements are held up owing to the lack of money available for investment. In some lines the outlook is better than a few weeks ago, and encouragement is taken from plans for railroad financing. The new improvement plan of the Southern Pacific includes the expenditure of $101,000 for tools for Oakland, Sacramento, and other places, in addition to a great deal of construction work on roads and buildings. Arrangements are also being made to re-finance a local interurban system. Municipal and state work involving the purchase of miscellaneous machinery is coming out steadily, and more is in prospect as bond issues are disposed of. A steady run of orders, mostly small, is coming from various Nevada mining districts, and pumping equipment for both irrigation and waterworks is in strong demand.

The most important machine tool proposition now in the market is equipment for the navy repair ship Prometheus and the Mare Island Navy Yard, the provisional list for which is now about complete, and it is expected that the inquiry will be out very shortly. The list as made out by the Mare Island officers amounts to about $200,000.

A list of some importance is expected soon for the shop of the Geary street municipal railroad.

It is reported that bids will be taken shortly at Honolulu for an electroplating plant, galvanizing plant, pneumatic tools and industrial railway for the naval station at Pearl Harbor, T. H.

Several machine shops north of San Francisco Bay are said to be very busy at present on winery equipment, pumps, presses, etc.

Construction has been started on the Chalmers automobile shop at Los Angeles, which will be one of the most completely equipped automobile shops on the coast.

The Southern California Edison Company has ordered a 30-ton Shaw electric crane.

The San Pedro, Los Angeles & Salt Lake Railroad has placed an order for a 42-in. Putnam car-wheel lathe.

A new foundry and machine shop project is being promoted at Riverside, Cal.

The Western Switch & Frog Company, recently organized, is preparing to install a $75,000 plant near Los Angeles for the manufacture of railroad specialties.

The Moore & Scott Iron Works will soon complete its new shop on Second street, this city, and has ordered a 17 in. x 10 ft. heavy duty type LeBlond motor-driven engine lathe.

The town of Tulare, Cal., is in the market for a waterworks outfit, including four pumps of 750 gal. per min. capacity each, two 60-hp. motors and two 40-hp. motors.

It is reported that the Tightner mine, Allegheny, Nev., will build a plant near its present mill for the treatment of concentrates.

Bids have been opened for the construction of the Cross Cut power house, near Phoenix, Ariz. The concrete building alone will cost about $40,000.

The city of Sacramento will take bids this week on dredging machinery for river improvement work.

The Economic Ice Machine Company, Los Angeles, has been incorporated, with a capital stock of $20,000, by R. A. Pulper, Leo Goldschmidt and B. A. Goldschmidt.

Antioch, Cal., has voted in favor of waterworks improvement.

The Sumner Iron Works, Everett, Wash., whose plant was recently destroyed by fire, will rebuild in that city on another site as the result of a campaign which will make a fund of $100,000 available for the re-establishment of the company's plant.

The city of San Diego, Cal., is considering plans for the equipment of a municipal machine shop, the matter being in the hands of a committee of the City Council.

Eastern Canada

TORONTO, June 21, 1913.

Mappin & Webb, Ltd., Montreal, has been incorporated with a capital stock of $500,000 by Albert Carter Johnston, and James Samuel Johnston, jewelers, Clarence Moore and others, to carry on the business of manufacturing jewelers, brass-founders and cutlers.

The International Valve Company, Ltd., Montreal, has been incorporated with a capital stock of $50,000 by Errol Languedoc, Edgar R. Parkins and others to carry on the business of mechanical engineers and to manufacture engines and other machinery.

Darling & Brady, Ltd., Montreal, has been incorporated with a capital stock of $100,000 by David John Morton Darling, Morton Darling, George Harold Baker and others to carry on the business of soap manufacturers.

Leclair & Chalifoux, Ltd., Montreal, has been incorporated with a capital stock of $50,000, by Leo Leclair, Hypolite Chalifoux and others to manufacture boots, shoes and leather.

The Canadian I. P. Morris Company, Ltd., Toronto, has been incorporated with a capital stock of $40,000 by Robert Gowans, William Bain and others, to manufacture hydroelectric apparatus, steam engines and other machinery.

The Farnham Wood Mfg. Company, Ltd., Montreal, has been incorporated with a capital stock of $200,000 by Francis George Bush and others, to manufacture lumber.

The bankhead at No. 2 colliery, Sydney Mines, N. S., was totally destroyed by fire. Considerable machinery was destroyed, and the loss will reach about $15,000, partly covered by insurance.

The British Canadian Lumber Corporation, Ltd., has asked shareholders to authorize a bond issue of $3,500,000 to provide for the erection of a mill at Port Renfrew, B. C., and for other purposes.

The Union Carbide Company has arranged to build a plant at Welland, Ont., to cost $750,000, and employ 700 men. The company has closed a contract with the Hydroelectric Commission for 17,000 hp. The town has granted a fixed assessment but no bonus. Building will start at once.

Roger, Miller & Sons, Toronto, have been awarded the contract for forty double lock gates for the Trent Canal. The company will build a plant at Trenton, Ont., to carry on the construction work.

The St. Lawrence Pulp & Lumber Corporation, Grand Pabos, Que., in which Wm. Whitmer of Wm. Whitmer & Sons, Philadelphia, is the major shareholder, has started the erection of a sulphite mill near Campbell, N. B., which will be of 100 tons capacity and will be completed to use next season's cut.

The City Council of St. Thomas, Ont., has decided, subject to an election, to guarantee $125,000 bonds of a motor truck factory which L. W. Ewing plans to establish.

Some Toronto wholesale grocers are starting a canning factory in Glencoe, Ont., to be known as the Glencoe Canning Company, with a capital of $100,000. Among those interested are the T. J. Medland Company, R. Muirhead and T. Loblaw. A plant will be erected this fall.

G. H. Doerr & Co., Berlin, Ont., will erect a large candy and biscuit factory.

The erection of a warehouse and grain elevator has been planned by T. Long & Bros., Collingwood, Ont.

The Klondike Lumber Company contemplates placing a flour mill at Souris, P. E. I. H. H. Acorn is manager.

Fire did considerable damage on July 19 to machinery in the plant of Robertson Bros. Cork Works, Port Colborne, Ont., and some replacement will be necessary.

Western Canada

WINNIPEG, June 20, 1913.

The local machinery houses report fairly numerous sales of small lots of machinery parts. A few good contracts also are reported. The volume of business is not as large as at the corresponding time last year, but the outlook is favorable. It is still expected that the rest of the season will be active. There is a good demand for gasoline engines and electric motors. Machinery for waterworks is fairly active, and there is considerable demand for parts for lumber mills, flour mills and grain elevators.

The civic authorities of Regina, Sask, will instal a new incinerator plant at once.

A report from Prince Albert, Sask., says that work on the plant of the Imperial Iron & Steel Corporation there is likely to start at once. James Kreis, consulting engineer, Chicago, has been in Prince Albert in connection with the undertaking, and he stated that no time would be lost in getting under way.

The terminal power station on Rover street, Winnipeg, is to be enlarged, and the contract has been awarded to the Fort Garry Construction Company, Winnipeg. The price is $35,800. New equipment will consist of transformers and switching apparatus.

The Silver Springs Brewing Company, Ltd., of which R. E. Glass, Saskatoon, Sask., is the promoter, will build a large brewery either at Saskatoon or Sutherland, Sask.

The British Columbia Electric Railway Company,

Vancouver, B. C., proposes to expend about $3,000,000 on a gas plant in that city. Work on the first unit, to cost about $750,000, will be started this year.

A. S. Porter, a prominent business man of Regina, Sask., has undertaken to organize a company, capitalized at $1,000,000, to develop the lignite coal of the Estevan district into power for Regina, Moose Jaw and the towns intervening. The name of the concern will be the Estevan Power, Gas & Development Company.

The Council of Edmonton, Alberta, has authorized the City Commissioners to spend $125,000 upon further provision for the sedimentation and filtration of water at the present pumping station. The clerk is C. Cox, and the engineer, A. J. Latournel.

It is again reported that the Maple Leaf Milling Company, Ltd., Toronto, will build a large flour mill at Medicine Hat, Alberta. This company has been looking for a suitable site for a mill in the West for the last couple of years.

Plans are in progress for a $50,000 factory for the Medicine Hat Pump & Brass Mfg. Company, Ltd., Medicine Hat, Alberta. It will require considerable machinery.

The sawmill of T. K. Smith, Vernon, B. C., which recently burned, with a loss of about $10,000, will be rebuilt at once.

The Canadian Linen Fibre Company, Ltd., Wadena, Sask., has signified its intention of establishing a factory.

The Saskatchewan Abattoirs, Ltd., capitalized at $200,000, a large portion of which is subscribed by the Standard Soap Mfg Company, St. Johns, Newfoundland, will erect an abattoir, cold storage plant and soap factory at Saskatoon, Sask.

Belley Brothers, Ltd., Calgary, Alberta, has been incorporated with a capital stock of $150,000 by Louise de Gonzague Belley, Alfred Belley and others, to build flour mills.

Herbert H. Clark, of the Clark Linseed Oil & Lead Company and the Mexican Palm Soap Company, of Kansas City, has announced that he will establish a flax mill, a soap factory and a paint and varnish factory in Brandon, Man., if the city will lend his company $130,000, to be secured by mortgage on the plant.

Plans are now being prepared by the Fitzhugh Lime & Stone Company, Edmonton, Alberta, for the installation of additional machinery to its plant, which will have the effect of increasing its output of lime from the present daily capacity of 10,000 barrels to 50,000.

Government Purchases

WASHINGTON, D. C., June 19, 1913.

The Bureau of Yards and Docks, Navy Department, Washington, will receive bids until July 12 for furnishing and installing one air compressor having at least 5300 cu. ft. of free air per minute displacement, complete, with accessories, for the Puget Sound navy yard. Estimated cost, $35,000.

The United States Engineer Depot, Washington Barracks, Washington, D. C., will receive bids until July 11 for furnishing a three-motor-driven, two-stage air compressor. Address W. J. Barden, major of engineers.

The supervising architect of the Treasury Department, Washington, will receive bids until July 21 for heating boilers, etc., for the post office, Port Townsend, Wash.

The Department of the Interior, Washington, will receive bids until June 30 for furnishing and installing an ash conveyor for the central heating plant, Freedmen's Hospital, Washington, D. C.

The Bureau of Supplies and Accounts, Washington, will receive bids for navy yard requirements as follows:

Until July 8, schedule 5574, for one electric conveyor, Washington; schedule 5576, for one engine lathe, one emery grinder and upright drills, for Portsmouth; schedule 5577, for one motor and one high pressure blower for Brooklyn; schedule 5578, for one metal melting furnace, for Brooklyn; schedule 5591, for automatic combination cut-outs and hangers, for Brooklyn.

Until July 15, schedule 5579, for one motor-driven engine lathe, one drill press, one motor-driven shaper, and one motor-driven grinder, for Mare Island; schedule 5581, for iron gate valves and iron reducing valves, for Mare Island; schedule 5594, for installing and repairing pumps at the navy hospital, New York.

Until July 22, schedule 5597, for pneumatic motor chain hoists, one motor-driven improved pipe threading and cutting-off machine, one motor-driven nipple-cutting machine, one hydraulic pipe bending machine, one pipe threading machine, one pipe threading and cutting-off machine and motor-driven grinding, abrasive machines.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, June 17, for furnishing navy yard requirements as follows:

Schedule 5476—Steam Engineering

Class 4. Mare Island—Fifteen pumps and one auxiliary condenser, with combined air and circulating pumps, Blake & Knowles Steam Pump Works, $16,640; Blackall-Baldwin Company, $4,430; Camden Iron Works, $5,350 (part), $6,520 (alt., part), $5,550 (alt., part), $4,930 (alt., part), and $5,415 (alt., part); Dow Pump & Diesel Engine Company, $10,940 part; D'Olier Centrifugal Pump & Machine Company $5,286; Manistee Iron Works Company, $2,283, part, and $2,569 part; Wm. E. Quimby, Inc., $13,770, part; Warren Steam Pump Company, $15,360; M. I. Davidson Company, $12,151, part.

Schedule 5477—Steam Engineering

Class 5, Puget Sound—One motor-driven turret lathe, Manning, Maxwell & Moore, $3,982; Niles-Bement-Pond Company, $4,619.

Class 5, Alternate—One motor-driven turret lathe delivery f.o.b. works or place of manufacture—Gisholt Machine Company, $4,625; Manning, Maxwell & Moore, $3,742; Niles-Bement Pond Company, $4,259.

Schedule 5528—Ordnance

Class 191, Washington—Two standard wormed ladles and two lip-pour ladles—H. A. Gillis, $1,060; J. W. Paxson Company, $1,475.

Class 192, Washington—Sixteen core-oven cars—H. A. Gillis, $155; Orenstein-Arthur Koppel Company, $127.52; J. W. Paxson Company, $170.

Schedule 5529—Ordnance

Class 193, Washington—One special steel-foundry cold-saw cutting-off machine—Manning, Maxwell & Moore, $2,310; Niles-Bement-Pond Company, $2,065; Tindel-Morris Company, $2,310; Newton Machine Tool Works, Inc., $2,103 and $2,065.

Class 194, Washington—One 50-in. steel-foundry, cold-saw cutting-off machine, complete—Manning, Maxwell & Moore, $5,365; Niles-Bement-Pond Company, $4,000; Newton Machine Tool Works, Inc., $4,344 and $4,035; Tindel-Morris Company, $5,365.

Class 195, Washington—One vertical cold-saw cutting-off machine—Newton Machine Tool Works, Inc., $4,119 and $4,006.

Class 196, Washington—One pedestal-type grinder—Manning, Maxwell & Moore, $560; Niles-Bement-Pond Company, $175; Newton Machine Tool Works, Inc., $135; Tindel-Morris Company, $560.

Schedule 5546—Construction and Repair

Class 203, Norfolk—One horning and wiring press—E. W. Bliss Company, $1,662; Manning, Maxwell & Moore, $1,650; The D. H. Stoll Company, $1,410.

Schedule 5520—Construction and Repair

Class 157, Brooklyn—Two double radial drills—The Walter H. Foster Company, $10,276 and $10,426 (alt.); Niles-Bement-Pond Company, $8,650.

Schedule 5521—Construction and Repair

Class 158, Portsmouth—One back-knife gauge lathe—J. A. Fay & Egan Company, $390; Baxter D. Whitney & Sons, $458.

The bids of the Kemp Machinery Company were not officially recorded on schedule No. 5467, covering Pearl Harbor requirements, for which tenders were opened June 10. The bids were confused with blueprints and not discovered by the department until Thursday. The prices on the various classes were as follows:

Class 174, $274.50; 175, $535 and $493.50; 176, $246; 177, $370; 178, $785; 179, $394; 180, $333.50; 182, $103.80; 186, $410; 191, $3,145.75 and $3,746.95; 192, $3,832 and $4,099.50; 193, $1,260.50 and $1,412.70; 194, $1,211.70 and $1,559; 195, $1,085.30; 196, $3,050.40; 197, $1,357; 198, $463.30; 199, $382.20 and $387.50; 201, $2,056.20; 203, $1,395; 204, $1,385; 205, $1,720; 207, $1,319.75; 208, $7.270; 209, $2,757 and $3,000; 212, $1,210; 213, $1,686; 214, $13,153.50; 215, $3,573.50; 218, $2,443; 219, $1,536; 220, $2,948 221, $596.65 and $895; 222, $910 and $1,035; 223, $470.70; 225, $3,049.80; 226, $2,000 and $2,245.50; 227, $2,317.40; 228, $2,130; 230, $4,378.60 and $6.367.70; 231, $2,105.95; 235, $904; 236, $720; 237, $355.20 and $447; 239, $28; 240, $1,232; 241, $2.583.75; 242, $237.65; 243, $375.80; 244, $846; 247, $256; 248, $331.80; 249, $1.217.50; 251, $765.90; 258, $344; 260, $89.95; 203, $683.45; 204, $1,834; 205, $732.50; 209, $1,692; 271, $900; 272, $132.80; 277, $1,150; 280, $451.70; 281, $1,155; 284, $311; 285, $1,065; 286, $591.85; 287, $431; 290, $263.55; 301, $1,559.30.

Trade Publications

Tin and Terne Plates—Wheeling Corrugating Company, Wheeling, W. Va. Sample book. Calls attention to a number of different types of tin and terne plates by providing cardboard leaves, with brief descriptions of the various types of plates, together with reproductions of the trademark. Alternating between these leaves are sections of the plates measuring 4¼ x 6¼ in. with the trademark embossed on them. The whole book is held together by metal rings and a chain is provided for hanging it up.

Centrifugal Condensers—Alberger Pump & Condenser Company, New York City. Bulletin No. 15. Illustrates and describes the Alberger Spiroflo centrifugal condenser which is of the low head jet type. A description of the condenser is given and the text is supplemented by numerous halftone engravings and line drawings. Mention is also made of engine and turbine driven removal pumps, a steam turbine of the Curtis type and a number of different types of air pumps, all of which are illustrated. A scale of absolute pressure and temperature of saturated steam, giving the co-relation of these properties, is also included.

Factory Heating and Ventilating—Green Fuel Economizer Company, Matteawan, N. Y. Bulletin No. 148. Contains reprints of an article on the hot blast heating and ventilating outfit installed in the plant of the Lee Tire & Rubber Company, which was described in *The Iron Age*, April 4, 1912, and one from the Engineering News of an article describing some tests made of the hot blast heating equipment of the fan shop of the company, which is a steel frame building, covered with corrugated iron. A number of views of the two plants are given as well as complete data of the tests made in both cases.

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